

MODIS

Science Data Processing Software

Version 3.0 System Description



June 30, 2001

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MODIS
Science Data Processing Software
Version 3.0 System Description

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Table of Contents

1. INTRODUCTION	1-1
1.1 Background	1-1
1.2 History of the MODIS System Description Document	1-2
1.3 Document Organization	1-5
2. RELATED DOCUMENTATION	2-1
2.1 Parent Documents	2-1
2.2 Applicable Documents	2-1
2.3 Informational Documents	2-1
3. SYSTEM ARCHITECTURE	3-1
3.1 System Concepts	3-1
3.2 System Structure	3-6
3.2.1 Product Generation Executives	3-6
3.2.2 MODIS Process Dependencies	3-7
3.2.3 MODIS Product Generation Executives	3-8
3.2.4 PGE Profiles	3-36
3.3 Operational Scenario	3-36
3.3.1 Environment	3-36
3.3.1.1 ECS Interfaces	3-36
3.3.1.2 M-API Interface	3-37
3.3.2 Data Interfaces	3-37
3.3.3 Processing Scenarios	3-38
3.3.3.1 Level 1 Processing Scenario	3-39
3.3.3.2 Atmosphere Processing Scenario	3-39
3.3.3.3 Ocean Processing Scenario	3-40
3.3.3.4 Land Processing Scenario	3-41
3.4 Science Data Products and Processing Files	3-45
4. PRODUCT GENERATION EXECUTIVES	4-1
4.1 Level 1A Raw Radiances and Geolocation (PGE01)	4-13
4.2 Level 1B Calibration (PGE02)	4-18
4.3 Level 2 Cloud Mask/Atmospheric Profiles (PGE03)	4-21
4.4 Level 2 Atmosphere (PGE04)	4-27
4.5 Level 3 Orbital Land Aerosol (PGE05)	4-32
4.6 Level 2 Clouds (PGE06)	4-34
4.7 Level 2 Snow Cover (PGE07)	4-41

4.8 Level 2 Sea Ice (PGE08)	4-44
4.9 Level 2 Ocean Color (PGE09)	4-47
4.10 Level 2 Sea Surface Temperature (PGE10)	4-54
4.11 Level 2 Land Surface Reflectance (PGE11)	4-60
4.12 Level 2G Pointers (PGE12)	4-66
4.13 Level 2G Land Surface Reflectance/Fire (PGE13)	4-73
4.14 Level 2G Snow Cover (PGE14)	4-78
4.15 Level 2G Sea Ice Extent (PGE15)	4-81
4.16 Level 2/Level 3 Land Surface Temperature (PGE16)	4-85
4.17 Oceans Ancillary Meteorological Preprocess (PGE17)	4-90
4.18 Oceans Ancillary Reynolds Sea Surface Temperature Preprocess (PGE18)	4-92
4.19 Oceans Ancillary Ozone Preprocess (PGE19)	4-94
4.20 Level 3 Daily Oceans Interim (PGE20)	4-96
4.21 Level 3 Land 8-Day Surface Reflectance (PGE21)	4-103
4.22 Level 3 Daily Aggregation (PGE22)	4-108
4.23 Level 3 16-Day Bi-Directional Reflectance Distribution Function/BARS (PGE23)	4-112
4.24 Level 3 16-Day Bi-Directional Reflectance Distribution Function/Albedo CMG (PGE24)	4-116
4.25 Level 3 16-Day Vegetation Indices 250 m and 500 m (PGE25)	4-118
4.26 Level 3 Monthly Vegetation Indices 1km (PGE26)	4-122
4.27 Level 3 16-Day Vegetation Indices CMG (PGE27)	4-125
4.28 Level 3 Monthly Vegetation Indices CMG (PGE28)	4-127
4.29 Level 3 Daily and 8-Day Thermal Anomalies/Fire (PGE29)	4-129
4.30 Level 2 Thermal Anomalies/Fire (PGE30)	4-133
4.31 Level 3 8-Day Land Surface Temperature (PGE31)	4-136
4.32 Level 3 Daily Land surface Temperature CMG (PGE32)	4-139
4.33 Level 4 Daily Leaf area Index/FPAR (PGE33)	4-141
4.34 Level 4 8-Day Leaf Area Index/FPAR (PGE34)	4-145
4.35 Level 3 16-Day Vegetation Indices 1km (PGE35)	4-148
4.36 Level 4 Daily Net Photosynthesis (PGE36)	4-151
4.37 Level 4 8-Day Net Photosynthesis (PGE37)	4-156
4.38 Level 4 Yearly Net Primary Production (PGE38)	4-160
4.39 Level 4 8-Day Net Photosynthesis CMG (PGE39)	4-164
4.40 Level 3 32-Day Land Cover (PGE40)	4-166
4.41 Level 3 96-Day Land Cover Quarterly (PGE41)	4-169
4.42 Level 3 96- Day Land Cover Quarterly CMG (PGE42)	4-173
4.43 Level 3 Daily Snow Cover (PGE43)	4-175
4.44 Level 3 Daily Sea Ice Extent (PGE44)	4-178
4.45 Level 3-8-Day Snow Cover (PGE45)	4-182
4.46 Level 3 Daily Snow Cover CMG (PGE46)	4-185
4.47 Level 3 8-Day Sea Ice Extent (PGE47)	4-187
4.48 Level 3 Daily Sea Ice Extent CMG (PGE48)	4-190
4.49 Level 3 8-Day Oceans Interim (PGE49)	4-192

4.50 Level 3 24-Day Oceans Reference (PGE50)	4-195
4.51 Level 4 8-Day and Running Yearly Oceans Productivity Indices (PGE51)	4-200
4.52 Level 4 8-Day Oceans Chlorophyll Running Year Average and Annual Empirical Productivity (PGE52)	4-206
4.53 Level 3 Daily Oceans (PGE53)	4-210
4.54 Level 3 8-Day Oceans (PGE54)	4-216
4.55 Level 3 Daily Clear Sky (PGE55)	4-222
4.56 Level 3 Daily Atmosphere (PGE56)	4-224
4.57 Level 3 Monthly Atmosphere (PGE57)	4-227
4.58 Level 3 8-Day Land Surface Temperature CMG (PGE58)	4-229
4.59 Level 3 32-Day Land Surface Temperature CMG (PGE59)	4-231
4.60 Geolocation Control Point (PGE60)	4-233
4.61 Level 4 Yearly Vegetation Continuous Fields (PGE61)	4-236
4.62 Level 3 32 -Day Thermal Anomalies/Fire CMG (PGE62)	4-238
4.63 Level 4 Monthly Leaf Area Index/FPAR CMG (PGE63)	4-240
4.64 Level 4 Yearly Net Primary Production CMG (PGE64)	4-242
4.65 Level 3 32-Day Bi-Directional Reflectance Distribution Function/Albedo CMG (PGE65)	4-244
4.66 Level 4 32-Day Vegetation Cover Conversion 250m (PGE66)	4-246
4.67 Level 3 8-Day Snow Cover CMG (PGE67)	4-249
4.68 Level 3 8-Day Sea Ice Extent CMG (PGE68)	4-251
4.69 Level 3 Daily Atmosphere Zonal Tiling (PGE69)	4-253
4.70 Level 3 8-Day Atmosphere (PGE70)	4-256
4.71 Level 1A Oceans Sub-setting (PGE71)	4-258
4.72 Level 16-Day Vegetation Intermediate Composite (PGE72)	4-260
4.73 Level 3 Monthly Oceans (PGE73)	4-263
4.74 Level 3 Yearly Oceans (PGE74)	4-269
4.75 Land Snow and Sea Ice Albedo, Reserved for Future (PGE75)	4-275
4.76 Level 1 Daily Ephemeris Predictor (PGE76)	4-276
5. PRODUCTION RULES	5-1
5.1 Top-Level Construction of Data Processing Scenario	5-1
5.2 Additions of Other Production Rules for the Data Processing Scenario	5-3
5.3 Optional Inputs and Alternate Inputs	5-3
5.4 Minimum Number of Granules and Associated Time-outs	5-4
5.5 Metadata-Based Activation and Metadata-Based Query	5-5
5.6 Runtime Parameters	5-5
5.6.1 MODIS Land Tiling Runtime Parameter	5-6
5.6.2 MODIS Ocean Data Day Runtime Parameters	5-7
5.7 Latitude/Longitude Tiling	5-7
5.7.1 Tile Definition File	5-7
5.7.2 Latitude/Longitude Tiling Production Rules for PGEs	5-8
5.7.3 MODIS Land Tiling Scenarios	5-8
5.7.3.1 Scenario 1a: L2G Pointers	5-8

5.7.3.2 Scenario 1b: L2G Land Products	5-10
5.7.3.3 Scenario 2: L3 and L4 Land Tiled Products	5-11
5.7.3.4 Scenario 3: L3 and L4 Land Tiled Products Generated at a Different Processing Center	5-12
5.8 Advanced Temporal Production Rule	5-13
5.8.1 Case 1: Input ESDT with Associated RangeDateTime Matching and Actual Valid Range in the File	5-16
5.8.2 Case 2: Input ESDT with Associated RangeDateTime and Averaged Times Appended in Each Daily File	5-17
5.8.3 Case 3: Input ESDT with Associated RangeDateTime and Synoptic Times Appended in Each Daily File	5-19
5.8.4 Case 4: Input ESDT with Associated SingleDateTime and Data Centered on Synoptic Time of File	5-22
5.9 Closest Granule Production Rule	5-25
5.10 PGE and ESDT Information To Be Provided by MODIS for the ECS PDPS at SSI&T	5-25
5.10.1 PGE ODL Parameters	5-26
5.10.2 ESDT ODL Parameters for Product Output Files	5-27
5.10.3 ESDT ODL Parameters for Product Input Files	5-28
5.10.4 ESDT ODL Parameters for Interim/Intermediate Files	5-30
5.10.5 ESDT ODL Parameters for Metadata-Based Activation	5-31
5.10.6 ESDT ODL Parameters for Metadata-Based Query	5-31
5.10.7 ESDT ODL Parameters for Runtime Parameters	5-32
6. SYSTEM PERFORMANCE	6-1
6.1 Performance Factors	6-1
6.2 Resource Utilization	6-1
7. SYSTEM OPERATION	7-1
APPENDIX A: ACRONYMS AND ABBREVIATIONS	A-1
APPENDIX B: REQUIREMENTS TRACEABILITY	B-1
APPENDIX C: ECS PRODUCTION RULES USED BY MODIS	C-1
C.1 Temporal	C-1
C.2 Orbit	C-2
C.3 Periodic	C-2
C.4 Tiling	C-3
C.5 Additional Inputs	C-4
C.6 Conditional Activation and Query-Based Activation	C-5
C.7 Data Base Query (Override of Run-Time Parameters)	C-5

List of Figures

Figure 3-1	SDPS Major Subsystems	3-4
Figure 3-2	MODIS SDP S/W Context Digram	3-5
Figure 3-3	Level 1 Processing at the GSFC DAAC	3-27
Figure 3-4	Atmosphere Processing at MODAPS	3-28
Figure 3-5	Oceans L2 Processing at MODAPS	3-29
Figure 3-6	Oceans L3 and L4 Processing at MODAPS	3-30
Figure 3-7	Level 2 and Level 2G Land Processing at MODAPS	3-31
Figure 3-8	Level 3 Land Processing at MODAPS	3-32
Figure 3-9	Level 3 Land Processing at MODAPS (con't)	3-33
Figure 3-10	Level 4 Land Processing at MODAPS	3-34
Figure 3-11	Level 3 Snow and Sea Ice Processing at MODAPS	3-35
Figure 4-1	PGE01 Structure	4-17
Figure 4-2	PGE03 Structure	4-26
Figure 4-3	PGE06 Structure	4-40
Figure 4-4	PGE09 Structure	4-53
Figure 4-5	PGE10 Structure	4-59
Figure 4-6	PGE12 Structure	4-72
Figure 4-7	PGE20 Structure	4-102
Figure 4-8	PGE50 Structure	4-199
Figure 4-9	PGE51 Structure	4-205
Figure 4-10	PGE52 Structure	4-209
Figure 4-11	PGE53 Structure	4-215
Figure 4-12	PGE54 Structure	4-221
Figure 4-13	PGE73 Structure	4-268
Figure 4-14	PGE74 Structure	4-274
Figure 5-1	Tiling Production Rule for L2G Pointers	5-9
Figure 5-2	Tiling Production Rule for L2G Land Products	5-11
Figure 5-3	Tiling Production Rule for L3 and L4 Land Products	5-12
Figure 5-4	Tiling Production Rule for L3 and L4 Land Products at a Different Processing Center	5-13

List of Tables

Table 3-1	MODIS Data Level Definitions	3-6
Table 3-2	MODIS SDP S/W PGEs, Production Rules, and Data Files	3-9
Table 3-3-1	MODIS Dynamic Product ESDTs	3-47
Table 3-3-2	MODIS Static File Container ESDTs	3-61
Table 3-4	MODIS Time-Varying Ancillary Data ESDTs	3-68
Table 3-5	Ancillary Data Used by MODIS through SDP Toolkit	3-74
Table 3-6	Oceans ESDTs to Product Longname Mapping	3-75
Table 4-1	Land Tile Projections, Sizes, and Ranges	4-8
Table 4-2	MODIS Land L2G PGE Profiles and Tile Schemes	4-10
Table 7-1	MODIS Level 1 and Level 2 Products Transferred from the GSFC DAAC to MODAPS	7-2
Table 7-2	MODIS Land Products Transferred from MODAPS to DEC and NSIDC DAACs	7-3
Table 7-3	MODIS Atmosphere Products Transferred from MODAPS to GSFC DAAC	7-7
Table 7-4	MODIS Ocean Products Transferred from MODAPS to GSFC DAAC	7-7
Table 7-5	MODIS Level 1 Products Not Transferred for Processing	7-11
Table 7-6	MODIS Land Interim Products	7-12
Table 7-7	MODIS Atmosphere Interim Products	7-14
Table 7-8	MODIS Oceans Interim Products	7-15

MODIS

Science Data Processing Software

Version 3.0 System Description

1. INTRODUCTION

The Moderate Resolution Imaging Spectroradiometer (MODIS) Science Data Production Software (SDP S/W) System Description Document (SDD) is intended to meet the following key objectives:

Provide a description of the structure and high-level workings of the MODIS SDP S/W.

Serve as a basic reference to the more detailed documents related to the MODIS SDP S/W, products, and operations procedures.

Satisfy the SDD requirement specified in the Science Software Integration and Test (SSI&T) Procedures for the MODIS Instrument at the Goddard Space Flight Center (GSFC), EROS Data Center (EDC), and the National Snow and Ice Data Center (NSIDC) Distributed Active Archive Centers (DAACs).

1.1 Background

The overall MODIS science objective is to make long-term observations of the Earth for improved understanding of the global dynamics and processes occurring on the land, oceans, and lower atmosphere. Global product resolutions range from one day to one year in the temporal scale and from 250 m to 1 degree on the spatial scale. The MODIS measurement objectives include surface temperature (land and ocean), ocean color (sediment, phytoplankton), cloud characteristics, aerosol concentrations and properties, atmospheric temperature and moisture structure, snow and ice cover characteristics, and ocean currents. Additional measurement objectives include chlorophyll concentration, primary productivity, sediment transport, standing water, wetland extent, vegetation properties, hemispherical albedo, bi-directional reflectance, cloud properties, and aerosol radiances. Derived MODIS products include global vegetation maps and global change (deforestation and desertification).

The Earth Observing System (EOS) Earth Sciences Data Information System (EDIS) Project originally planned for GSFC, EDC, and NSIDC DAACs to run the MODIS Science Data Processing Software using the Planning and Data

Processing System (PDPS) developed by the EOS Data and Information System (EOSDIS) Core System

(ECS). The DAACs have always been solely responsible for the archive and distribution of the science data products.

1.2 History of the MODIS System Description Document

During the early days of the development of the MODIS Science Data Processing Software, Version 1 of the SDP S/W System Description document was written and published on April 18, 1997. The science software algorithms from the developers were each packaged into a Product Generation Executive (PGE) for execution at one of the DAACs. This document contained a brief outline of the PGE packages of science software being developed at the Science Computing Facilities (SCFs) and MODIS products to be generated for archive at the DAACs and released to the public. The description of the production rules and scenarios were based on plans for running the software under ECS at the DAACs.

During 1997 to 1998 MODIS had been developing the MODIS Emergency Backup System (MEBS) data processing core software to process the MODIS data if the ECS PDPS was not yet able to process the data at the DAACs. The MEBS development team implemented many of the production rules that ECS had planned to use in running the PGEs to generate the science products at the DAACs. As the SCFs began to deliver the first versions of the science software containing preliminary algorithms, MEBS was used to test the science software in a semi-production type of environment.

MODIS Version 2.0 PGEs were delivered to the MODIS SDST and integrated into the MODIS SDPS Version 2.0 System from September of 1997 until the system was baselined in May of 1998. Version 2.0 of the SDP S/W System Description document was written and published on May 19, 1998 and was updated August 25, 1998. This document contained a vastly expanded description of the PGEs, production rules and scenarios, a revised set of products, and new data flow diagrams to reflect the changes in PGEs since Version 1. The Version 2.0 System of Science Software grew rapidly as the planned Terra Launch approached. As significant changes were made to the PGEs, the second digit of the PGE Version was incremented; a third digit was added for minor changes.

In 1998 planning began for the PI-led MODIS Data Processing System to run the higher level MODIS SDP S/W. During this period, the MEBS team planned and developed a MODIS Data Processing System (MODAPS) to replace MEBS. MEBS became MODAPS V0 which was planned to be operational for system functional and stress testing before the Terra Launch. Further improvements were planned for the post-launch period.

MODAPS was built on the MEBS in several planned releases. MODAPS Version 1 consisted of the existing MEBS core system with the added Science Investigator-Led Processing System (SIPS) interface for transferring products. MODAPS Version 2 was being developed to provide a timely, stable processing environment to ingest the MODIS Level 1 products from the GSFC DAAC, support the production of MODIS Level 2 to 4 MODIS products at the EOS specified levels, and transfer these products to the DAACs for archive and distribution. MODAPS was also being developed to support rapid changes to the MODIS processing algorithms and distribute at least 10% of all MODIS products to the MODIS Science Team for quality assurance and validation.

In the fall of 1998, the ESDIS Project transferred the responsibility for production of the MODIS Level 2 to Level 4 Science Data Products out of the ECS and into MODAPS, a Principal Investigator (PI) led Processing System. MODAPS was responsible for producing the MODIS Level 2 to Level 4 Products at the Team Leader Science Computing Facility (TL-SCF) at GSFC. The GSFC DAAC was responsible for producing the MODIS Level 1 Products at its facility using the ECS PDPS. The Level 1 products include Level 1 A (L1A) scans of Raw Radiance measurements, L1 Geolocation, Level 1 B (L1B) Calibrated Radiances, Cloud Mask, and Atmospheric Profiles. MODAPS would receive the Level 1 products needed for Level 2 to Level 4 processing from the GSFC DAAC. MODAPS would transfer the higher level MODIS Science Data Products to the appropriate DAAC for archive and distribution to the science data users.

As the improved Launch Ready versions of the MODIS PGEs were delivered from the SCFs to SDST for integration and test, Version 2.1 of the SDP S/W System Description document was written and published on May 20, 1999. MODAPS had been primarily running Versions 2.0 and 2.1 of the MODIS Science Data Software which comprise compatible MODIS Science Data Processing Systems. This is the science software described in Version 2.1 of the MODIS SDP S/W SDD.

The Version 2.1 of the SDD was intended to be the last version that would attempt to describe all of the MODIS Science Software Processes or groups of processes which are currently running or under testing at the MODIS facility and all of the known processes which are planned for future deliveries. Future versions of the SDD would describe only the MODIS Science Software and version of this software that were running, or close to being delivered, in the current MODIS Science Data Processing System or at the GSFC DAAC. The versions of the MODIS SDP System are determined primarily by the underlying system processing capabilities and processing scenarios, versions of the individual science software processes or groups of processes that are compatible or will execute correctly with this version of the MODIS SDP System and other MODIS processes in the system, and the resulting set of MODIS products.

Version 2.1 of the SDD was also intended to be the last version that would adequately describe how the science software was intended to be run under the ECS at the DAACs. The rules that the data processing system uses for staging product inputs and generating product outputs have been formulated for implementation under ECS. Under MEBS many of the rules had to be implemented manually. The MEBS to MODAPS transition would result in an operational system with many automated features and capabilities. The production rules for MODAPS would result in the same products, but the implementation of the rules would be different.

The primary changes to the science software between Version 2.0 of the SDD and Version 2.1 of the SDD have been in the Land Discipline. Some of the data products that are produced in both day and night modes were now split into two separate products and new features were added to the production scenarios for the software that generates the Land products. References to specific ECS and DAAC functions and activities that had been cancelled were deleted from this SDD version. The data processing center for most MODIS products was now MODAPS. The disposition and transfer of products was indicated in updated tables and figures.

On December 18, 1999 Terra was launched at Vandenberg Air Force Base. MODAPS V1 was completed and put into operations just before the launch. Science algorithms and scenarios for running the PGEs were in a state of rapid change in the first year of the Terra Mission. Version 2.2 of the SDD was in a state of constant flux during this time. A section was added to each PGE

description to describe the operational scenario for the PGE under MODAPS V1. Other sections were added to each PGE to list the dynamic and static runtime parameters required for the PGE in operations. The descriptions of the individual PGEs and sections of information from the SDD were put onto a WWW MODIS System Description Page. Thus the Version 2.2 MODIS SDP S/W SDD became a living document.

At the end of year 2000, plans were underway for reprocessing the MODIS data to make a "Consistent Year" Collection starting from November 2000, when the switch to the B-side electronics was made on the Terra spacecraft, and forward processing new data until a year was completed in November 2001. The new MODIS Data Collection to be archived at the DAACs was given the Version number of 3. In accord with the MODIS Collection, the Version 3.0 SDP S/W System Description document was written and published in June of year 2001.

In April of 2001, MODAPS V2 was installed into Terra operations, in time for the "Consistent Year" of reprocessing. A section has been added to each PGE description to describe the operational scenario for the PGE under MODAPS V2. Production rules for each PGE were updated, input data sets to PGEs were updated, and new output products were added. Many new interim QC products, coarse resolution products, and subsetted products were added as outputs from PGEs for validation purposes. The Version 3.0 SDD contains several new PGEs, some of which replace PGEs that were deleted. The document also contains a few place holder type of descriptions for PGEs which the SCFs will deliver in the near future.

1.3 Document Organization

The contents of the SDD have been organized to present and describe the MODIS SDP S/W from a system overview down to a detailed description for each of the individual science processes. The suggested guidelines for a system description document, which are outlined in Appendix C of the Science User's Guide and Operations Procedure Handbook for the EOS Core System (ECS) Project, Part 4: Software Developer's Guide to Preparation, Delivery, Integration, and Test with the ECS; 205-CD-002-005 (referred to as DID 205), have been included in the outlined sections for the MODIS SDD. This document also contains additional topics relevant to MODIS software and its operations within the ECS.

The following sections are contained in this document:

- Section 1 contains an introduction to the Version 3.0 (V3.0) MODIS system.
 - Section 1.1 provides a brief background of the MODIS Science Data Processing (SDP) system.
 - Section 1.2 provides the organization of this document.
- Section 2 contains a listing of related documentation.
- Section 3 describes the system architecture.
 - Section 3.1 provides a functional description of the MODIS SDP system concepts.
 - Section 3.2 contains an overview of the MODIS SDP system structure.
 - Section 3.3 provides a description of the MODIS SDP operational scenario.
 - Section 3.4 provides a brief description of the various standard, interim/intermediate, or temporary products.
- Section 4 identifies and describes the Product Generation Executives (PGEs).
- Section 5 provides a description of the ECS Production Rules.
- Section 6 describes nominal system performance measures for each PGE.
- Section 7 briefly describes the system operations for V3.0.
- Appendix A contains the Acronym List.
- Appendix B provides the requirements traceability.
- Appendix C provides the ECS Production Rules Used by MODIS.

2. RELATED DOCUMENTATION

2.1 Parent Documents

- Team Leader Working Agreement for MODIS Between EOS AM & PM Projects GSFC and the MODIS Science Team Leader; GSFC 421-12-13-02, April 21, 1994.
- MODIS Science Data Processing Software Requirements Specification Version 2 and Beyond; SDST-089, Change Notice 1; November 10, 1997.

2.2 Applicable Documents

- MODIS Version 2 Processing Files Descriptions; to be written.
- MODIS Version 2 Science Software Integration and Test Procedures and Agreement with the GSFC DAAC; GSFC DAAC; March 9, 1998.
- Science User's Guide and Operations Procedure Handbook for the EOS Core System (ECS) Project, Part 4: Software Developer's Guide to Preparation, Delivery, Integration, and Test with the ECS; 205-CD-002-005; October 1997.
- MODIS Data Processing System Requirements Specification; SDST-117; March 1999.

2.3 Informational Documents

- MODIS Software Management Plan; SDST-002, October 24, 1995.
- MODIS Data Management Plan; SDST-006, October 25, 1995.
- MODIS Software Development Standards and Guidelines; SDST-022C Change Notice 1; September 11, 1997.
- M-API User's Guide, Version 2.3; SDST-064C; February 19, 1998.
- MODIS Version 2 Team Leader Computing Facility Product Generation Executive Test Plan; SDST-062, February 19, 1998.
- MODIS Version 2 Science Computing Facility Software Delivery Guide; SDST-096B, March 26, 1998.
- B.0 Implementation Earth Science Data Model for the ECS Project; 420-TP-015-002; December 1997.
- Data Production Software (DPS) and Science Computing Facility (SCF) Standards and Guidelines; October 1996.

- EOS Reference Handbook; 1996.
- Interface Control Document (ICD) Between EOSDIS Core System (ECS) and SCF, Revision A, (505-41-33).; September 1996.
- Release B SDPS/CSMS Design Specification Overview for the ECS Project; 305-CD-020-002; March 1996.
- Release B.0 SCF Toolkit Users Guide for the ECS Project; 333-CD-003-001; April 1997.

MODIS Science Data Processing Software Version 1 System Description; SDST 065, April 18, 1997.

MODIS Science Data Processing Software Version 2.0 System Description; SDST-104, May 19, 1998.

MODIS Science Data Processing Software Version 2.0 System Description; SDST-104, Change Notice 1; August 25, 1998.

MODIS Science Data Processing Software Version 2.1 System Description; SDST-119, May 20, 1999.

3. SYSTEM ARCHITECTURE

The MODIS SDPS S/W system integrates the science algorithms developed by investigators in atmosphere, oceans, and land disciplines into a common data processing environment. This processing environment will provide usable science information products in common formats for archive and distribution to science and educational communities throughout the world. The following sections briefly describe the concepts, structure, and operational scenarios of the MODIS Science Data Processing Segment (SDPS) and its science data products and processing files.

3.1 System Concepts

The MODIS SDP S/W system is designed to run within the Earth Observing System (EOS) Data and Information System (EOSDIS) Core System (ECS). The MODIS system is a part of the SDPS of the EOS Ground System (EGS). Figure 3-1 shows the major subsystems comprising the SDPS. The reader should refer to the ECS design documents if more details about the SDPS are desired. These documents can be found on the internet at Universal Resource Locator (URL): <http://edhs1.gsfc.nasa.gov>.

The actual data processing and product generation for MODIS Level 1 is performed at the GSFC DAAC. The Cloud Mask and Atmospheric Profiles software are considered for the purpose of processing to be Level 1 even though they are actually create Level 2 swaths of data. The ECS SDPS is installed and operated at each of the DAACs, along with data processing hardware and other DAAC-specific systems. The MODIS Level 2 to Level 4 data processing is performed at MODAPS. The MODIS products are transferred to three DAACs located at GSFC, EDC, and NSIDC for archive and distribution.

Figure 3-2 is the context diagram for the purposes of the SDD. The MODIS SDP S/W System receives MODIS Level 0 data and any required ancillary data via the ECS SDPS and produces the MODIS Level 1 products, which are archived by the ECS SDPS. The higher level products are produced by MODAPS and exported to the DAACs for archive. All processing software is categorized according to the level of data products it produces, with the data level definitions given in Table 3-1.

The original MODIS standard products are defined in Table B-1 of the MODIS Science Data Processing Software Requirements Specification Version 2 and Beyond. The software processes that produce these products are specified by the development teams. The SDPS design requires that the software be designed and installed at the DAACs or at MODAPS as a set of PGEs. The concept of the PGE is discussed in the following section.

The MODIS Level 1 PGEs are scheduled and executed entirely under control of the ECS SDPS Planning and Data Processing Subsystems operating at the GSFC DAAC. The SDPS also provides all data archive, inventory, query, distribution and other required services. Thus, the MODIS SDP S/W consists entirely of the individual PGEs and will only run automatically in the SDPS or other environment that provides comparable functionality.

The MODIS Level 2 to Level 4 PGEs are scheduled and executed entirely under control of the MODAPS. The MODIS products are stored at the MODAPS site until the MODIS Science Team has completed the quality assurance and the products are no longer needed for downstream processing. Only MODIS standard products go to the DAACs for archive and distribution. MODIS interim products would only go to data.the GSFC DAAC if they are needed there for non-standard processing.

The MODIS instrument surveys the Earth's surface continuously, in one of two modes: day mode, in which data from all 36 bands are collected; and night-mode, in which data collection is limited to 17 infrared bands. The data collection mode is commanded by the Flight Operations Segment (FOS). This distinction is important because several of the Level 2 (L2) processes only use day mode data.

The fundamental units of MODIS processing and products are: the granule, for Level 1 (L1) and L2 products; the tile, for Land Level 2G (L2G), Level 3 (L3) products, and Level 4 (L4); and the global grid, for Oceans and Atmosphere L3 products and all Climate Modeling Grid (CMG) products. The granule definition is based on a fixed time interval of 5 minutes (e.g., the granule will contain all of the MODIS scans which start within a 5-minute interval), synchronized with the start of the Universal Time Coordinated (UTC) day. This results in 288 granules per day, of which 144 will be day mode.

The Land tiles for most products have subsets of a global equal-area grid which is based on an Integerized Sinusoidal Projection. The tiles are $10^{\circ} \times 10^{\circ}$ and the grid resolution within the tiles is 250m, 500m, or 1 km, depending on the product. Sea ice products have tiles defined in the EASE-Grid polar projection. The global grids used by Oceans, Atmosphere, and CMG products are either equal-area or equal-angle grids, with the resolution defined for each product.

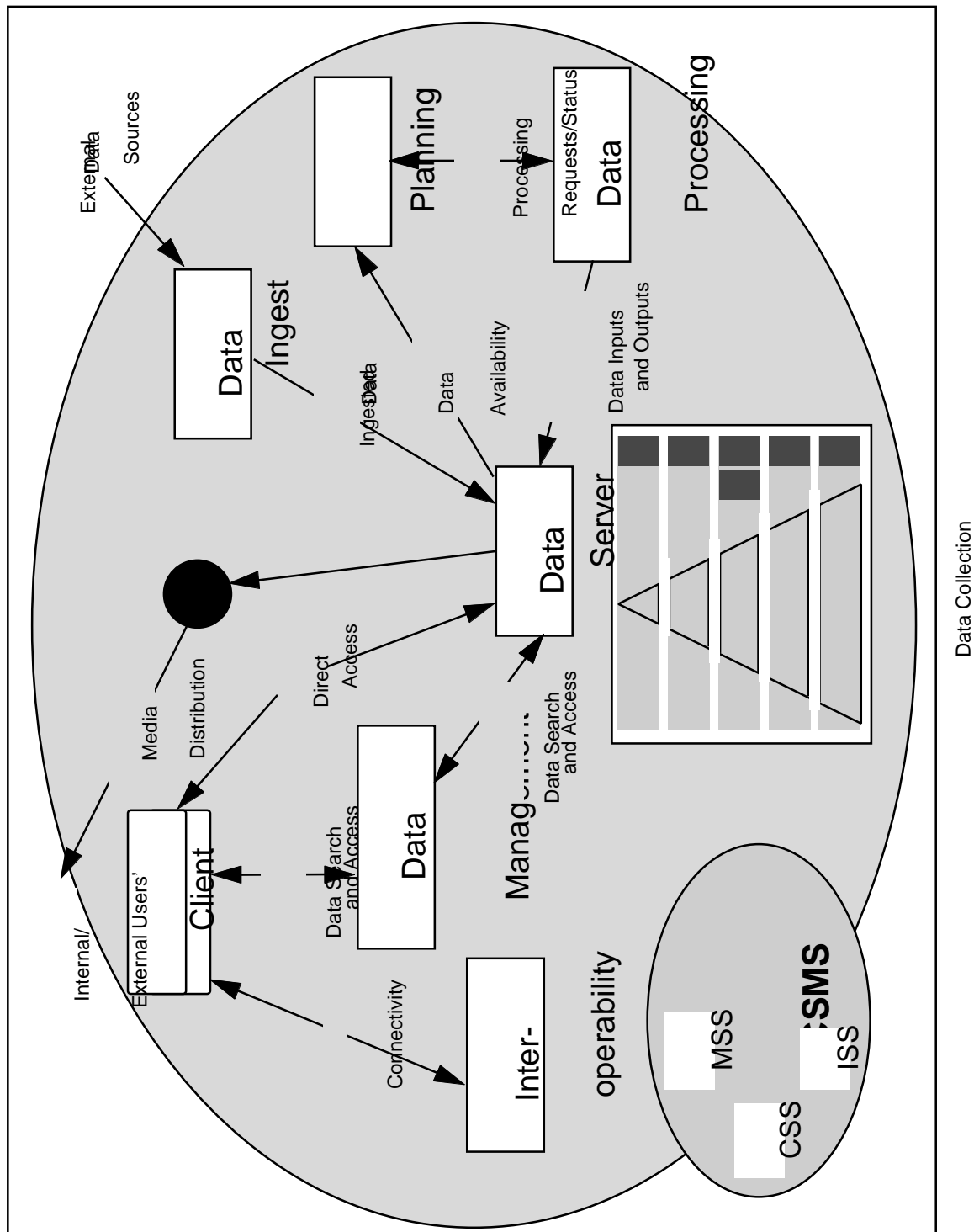


Figure 3-1SDPS Major Subsystems

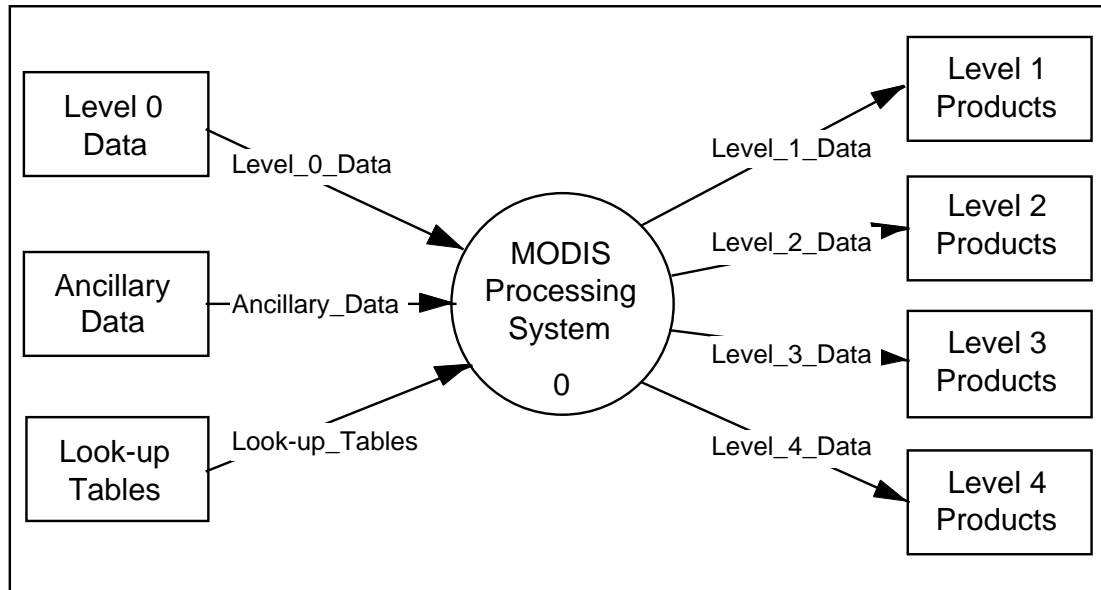


Figure 3-2 MODIS SDP S/W Context Diagram

Table 3-1. MODIS Data Level Definitions

Data Level	Data Definition
Level 0	Instrument data at original resolution, time order-restored, with duplicate packets removed.
Level 1A	Level 0 data which are reformatted with calibration data and other ancillary data included. Geolocation information for each 1 km spatial element of the reformatted swath data will be stored as a separate product.
Level 1B	L1A data to which the radiometric calibration algorithms have been applied to produce radiances or irradiances.
Level 2	Geophysical parameter data retrieved from the L1B data by application of geophysical parameter algorithms.
Level 2G	Similar to L2 but contains pixel to grid mappings within the product files.
Level 3	Earth-gridded geophysical parameter data, which have been averaged, gridded, or otherwise rectified or composited in time and space.
Level 4	Model output or results of analysis from lower-level data; for example, variables derived from multiple measurements.

3.2 System Structure

The MODIS SDP S/W is comprised of a collection of PGEs that run under control of the MODAPS or the ECS SDPS. The definitions of the PGEs and the data flows between them constitute a structure of the MODIS system, which can be discussed independently from the overall MODAPS or ECS environments. This structure has two overall drivers: the need to define PGEs to run the MODIS science data processes and the interdependencies among the MODIS processes themselves. Each of these is discussed below, followed by a summary of the MODIS PGEs with version numbers starting with 3.0.0 at the beginning of the “Consistent Year” Reprocessing.

3.2.1 Product Generation Executives

The PGE is a data processing concept that has been defined by ECS as part of the overall design of the SDPS. PGEs are described in detail in DID205, and much of this information is also summarized on the ECS Instrument Team (IT) Information WWW site (URL: <http://ecsinfo.hitc.com/iteams/iteams.html>). The characteristics of PGEs that influence the overall design of the MODIS system are summarized here.

A PGE is the smallest unit of science processing software that will be independently described, scheduled, and executed within a DAAC or other data processing center. A PGE can be a single process, or multiple processes controlled by a script. There are no specific limits on the number of processes within a PGE or the number of products produced, although DID205 does provide guidelines in these areas; the definition of individual PGEs is the responsibility of the Instrument Teams.

In addition to the processes which comprise a PGE, the ITs also define the conditions that must be met to activate each instantiation of the PGE. These conditions, which are codified within the DAAC or MODAPS as a set of Production Rules, define the specific data products which must be available for a PGE to run. The Production Rules will be registered with the GSFC DAAC as a part of the overall SSI&T process or with MODAPS as part of the installation process. In this document, the activation rules for each PGE will be summarized as part of the overall description of the PGE for both PGEs running at the GSFC DAAC and at MODAPS.

In addition to the general guidelines contained in ECS documentation, ECS has determined that the number of PGE executions at a DAAC should be limited to about 4000 per day. This constraint is imposed by the ECS Planning and Data Processing System (PDPS) scheduling software, whose performance has been shown to degrade significantly when the number of executions rises much above this number. It is important for designing the PGEs that run at the GSFC DAAC, where the L1 processing is performed. The number of executions at the GSFC DAAC would significantly exceed the limit if each process were run as a separate PGE. Therefore, some combining of processes in PGEs is indicated; this must be balanced against overall guidelines for minimizing the complexity of PGEs.

3.2.2 MODIS Process Dependencies

The order and timing of processing by individual MODIS science data processes is largely constrained by the MODIS products required as input for each process, which in turn are produced by other MODIS processes. For example, MODIS L2 processes require L1B and Geolocation data as input; these products are generated by processes which require L1A data, whose production in turn depends on the availability of Level 0 data. In addition, several L2 processes require other L2 products as input. These dependencies define the overall data flow and structure of the MODIS system. (Note that several MODIS processes

require products from earlier time periods as input; for purposes of the PGE design these dependencies were assumed to not affect the order or timing of the processing.)

The data dependencies of the MODIS V3.0.0 processes and unmodified, compatible processes with previous versions have been analyzed based on the process definitions provided by the individual scientists and developers. This information was used to determine which processes have common data needs, in terms of both products and time scales, and are therefore candidates for being combined into a single PGE.

3.2.3 MODIS Product Generation Executives

The MODIS V3.0.0 and compatible PGEs with earlier versions are summarized in Table 3-2. The table contains the following information for each PGE: an identification number and a descriptive name; the Production Rules; the level of the products produced by the PGE; the data processing center where the PGE is run; the MODIS processes which comprise the PGE; Earth Science Data Type (ESDT) input files; ESDT output files; the upper limit on the number of executions per processing period per PGE profile (i.e., the number of executions per day or per longer time period if the PGE does not run every day); and the processing period associated with the PGE. If the PGE has multiple profiles, the upper limit on the number of executions must be multiplied by the number of profiles. The PGEs which use the Tiling Production Rule run once per tile per processing period for each profile. Each PGE is described in detail in Section 4.

Figures 3-3 through 3-7 illustrate the data flow among the PGEs. They show the inter-PGE dependencies for the MODIS SDP S/W, the order in which the PGEs must be executed, generic ancillary data inputs, the ESDT input products, and ESDT output products. Data stores are used to indicate flows which feed into several processes (e.g., L1, Profiles, and Clouds) or which represent transfers between the GSFC DAAC and MODAPS. The figures do not show all of the additional sources of data required by the PGEs [e.g., specific ESDTs for ancillary data and Look-Up-Tables (LUTs)], the data flow to the product archives, or the specific number of each type of input product required; most of this information is included in the detailed PGE descriptions in Section 4.

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files

Notes: nn¹=one of parameters 1 through 36; mm¹=one of the parameters D1, D2, N1, or N2;
 ##¹ = one of parameters 1 through 36, or D1, D2, N1 or N2, or 41-61, 63-66, or 69-78;
 qq¹=one of parameters 41-61, 63-66; ##²=one of the parameters 1 through 36 or D1, D2, N1, or N2
 rr¹=one of parameters D1-D9, DA, N1-N9, NA;
 xx²=one of parameters M1, M2, ME, MD, N1, N2, F1, F2; yy²=one of parameters M1, M2, S1, S2, W1, W2, N1, N2, F1, F2;
 zz²=one of parameters MP, MN, MX, MC, SC, WC, NC, FC

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE01 Level 1A Raw Radiances/ Geolocation	Basic Temporal, Advanced Temporal, Optional Inputs	1	GSFC	MOD_PR01	MOD000, MOD01LUT	MOD01	288 granules/day	5 min.
				MOD_PR03	MOD01, MOD03LUT, AM1EPHN0, AM1ATTNF	MOD03, MOD01		
PGE02 Level 1B Calibration	Basic Temporal, Advanced Temporal, Optional Inputs	1	GSFC	MOD_PR02	MOD01, MOD02LUT, MOD03	MOD021KM, MOD02HKM, MOD02QKM, MOD02OBC	288 granules/day	5 min.
				MOD_PR02QA	MOD021KM	MOD021QA		
PGE03 Level 2 Cloud Mask/ Atmospheric Profiles	Basic Temporal, Advanced Temporal, Optional Inputs	2	GSFC	MOD_PR35	MOD021KM, MOD02QKM, MOD03, MOD35ANC, GDAS_0ZF, OZ_DAILY, NISE, REYNSST, SEA_ICE, MODCSR_8 (Future)	MOD35_L2, MOD35_QC, MODCSR_G, Three temporary files	288 granules/day	5 min.
				MOD_PR07	MOD021KM, MOD03, MOD35_L2, MOD07LUT, GDAS_0ZF, NISE, OZ_DAILY, REYNSST, SEA_ICE	MOD07_L2, MOD07_QC, Three temporary files		
				MOD_PRVOLC	MOD021KM, MOD03	MODVOLC		

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE04 Level 2 Atmosphere	Basic Temporal, Advanced Temporal	2	MODAPS	MOD_PR04_05	MOD03, MOD021KM, MOD02HKM, MOD02QKM, MOD35_L2, MOD07_L2, MOD05LUR, MOD05LUW, MOD05CLUR (Future), MOD04LUT, GDAS_0ZF, OZ_DAILY, REYNSST, SEA_ICE	MOD04_L2, MOD04_QC, MOD05_L2, MOD05_QC, MOD05C_QC (Future), Three temporary files	288 granules/day	5 min.
PGE05 Level 3 Orbital Land Aerosol	Orbit-Based Activation, Min. # of Granules	3	MODAPS	MOD_PR04ORB	MOD04_L2	MOD04L_O	~15 orbits/day	1 orbit
PGE06 Level 2 Clouds	Basic Temporal, Advanced Temporal, Optional Inputs	2	MODAPS	MOD_PR06CR	MOD021KM	MOD06_L2	288 granules/day	5 min.
				MOD_PR06CT	MOD021KM, MOD03, MOD35_L2, MOD06LUT, MOD35ANC, GDAS_0ZF, OZ_DAILY, REYNSST, SEA_ICE, NISE, MODCSR_8 (Future)	MOD06_L2, MOD6CTQC, Three temporary files		
				MOD_PR06CD	MOD021KM, MOD03, MOD35_L2, MOD06_L2, MOD06LUT	MOD06_L2, MOD6CDQC		
				MOD_PR06OD	MOD021KM, MOD35_L2, MOD07_L2, MOD06_L2, MOD06LUT, MOD35ANC, GDAS_0ZF, OZ_DAILY, REYNSST, SEA_ICE, NISE, DFLAXENG (Future), DFLAXCLD (Future), DFLAPMIS (Future)	MOD06_L2, MOD6ODQC, MOD6ANCT, Three temporary files		
PGE07 Level 2 Snow Cover	Basic Temporal, Meta. Based Query	2	MODAPS	MOD_PR10	MOD02HKM, MOD03, MOD35_L2	MOD10_L2, MOD10L2C	144 granules/day	5 min.
				MOD_PRLQA	MOD10_L2	MODLM_QA		
PGE08 Level 2 Sea Ice	Basic Temporal, Meta. Based Query	2	MODAPS	MOD_PR29	MOD021KM, MOD03, MOD35_L2,	MOD29, MOD29L2C	288 granules/day	5 min.
				MOD_PRLQA	MOD29	MODLM_QA		
PGE09 Level 2 Ocean Color	Basic Temporal, Advanced Temporal, Meta. Based Query, Nearest Temporal Match	2, 3	MODAPS	MOD_PR18	MOD021KM, MOD03, MOD35_L2, MODOCNMC, MODOCOZN, REYNSST, MODOCLUT, MODOCAER, MODOCBIN, MODOCRAY, MODSEACL, MODOCREY (Future)	MODOCL2, MODOCL2A, MODOCL2B, MODOCQC	144 granules/day	5 min.

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE09 Level 2 Ocean Color (Con't)				MOD_PRmsbin	MODOCL2, MODOCL2A, MODOCL2B, MOD03, AM1EPHH	MODOCBnn ¹ , MODOQBqq1		
PGE10 Level 2 Sea Surface Temperature	Basic Temporal, Advanced Temporal, Nearest Temporal Match	2,3	MODAPS	MOD_PR28	MOD35_L2, MOD021KM, MOD03, MOD28LUT, MODOCNMC, MODOCOZN, REYNSST, MODOCREY (Future), MOD28PAR, MODOCBIN	MOD28L2, MOD28QC	288 granules/day	5 min.
				MOD_PRmsbin	MOD28L2, MOD03, MOD28LUT, AM1EPHH	MOD28Bmm ¹ , MODSQBrr ¹		
PGE11 Level 2 Land Surface Reflectance	Orbit-Based Activation, Optional Inputs, Advanced Temporal, Min. # of Granules, Runtime Parameters	2	MODAPS	MOD_PR09	MOD021KM, MOD02HKM, MOD02QKM, MOD03, MOD35_L2, MOD09LU1, MOD09LU2, MOD09LU3, GDAS_0ZF, OZ_DAILY, DFLAXCHM (Future), DFLAXENG (Future), DFLAXMIS (Future)	MOD09, MOD09CRS, MOD02CRS, MOD02CSS	~15 orbits/day	1 orbit (covers ~18 5 min. granules)
				MOD_PRLQA	MOD09	MODLM_QA		
PGE12 Level 2G Pointers	Period Specification, Lat/Long Tiling, Meta. Based Query, Min. # of Granules, Runtime Parameters	2G	MODAPS	MOD_PRMGPNTR	MOD03	MODPT1KD, MODPT1KN, MODPTHKM, MODPTQKM, MODPTPGD, MODPTPGN, MODPTPHD, MODPTPQD	384 tiles/day	1 day
				MOD_PRMGR	MOD03, MODPT1KD, MODPT1KN	MODMGGAD, MODMGGAN, MODMGPGD, MODMGPGN		

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE12 Level 2G Pointers (con't)				MOD_PRLQA	MODPT1KD, MODPT1KN, MODPTHKM, MODPTQKM, MODPTPGD, MODPTPGN, MODPTPHD, MODPTPQD, MODMGGAD MODMGGAN, MODMGPGD, MODMGPGN	MODLM_QA		
PGE13 Level 2G Land Surface Reflectance/Fire	Period Specification, Lat/Long Tiling, Min. # of Granules, Runtime Parameters, Meta. Based Query	2G	MODAPS	MOD_PRMGR	MOD09, MODPTHKM, MODPTQKM, MOD14, MODPT1KD, MODPT1KN	MOD09GHK, MOD09GQK, MOD09GST, MOD14GD, MOD14GN	338 tiles/day	1 day
				MOD_PRLQA	MOD09GHK, MOD09GQK, MOD09GST, MOD14GD, MOD14GN	MODLM_QA		
PGE14 Level 2G Snow Cover	Period Specification, Lat/Long Tiling, Min. # of Granules, Runtime Parameters, Meta. Based Query	2G	MODAPS	MOD_PRMGR	MOD10_L2, MODPTHKM	MOD10L2G	338 tiles/day	1 day
				MOD_PRLQA	MOD10L2G	MODLM_QA		
PGE15 Level 2G Sea Ice Extent	Period Specification, Lat/Long Tiling, Meta. Based Query, Min. # of Granules, Runtime Parameters	2G	MODAPS	MOD_PRMGR	MOD29, MODPTPGD, MODPTPGN, MODPT1KD (Alternate ISIN), MODPT1KN (Alternate ISIN)	MOD29PGD, MOD29PGN, MOD29GD (Alternate ISIN), MOD29GN, (Alternate ISIN)	130 tiles /day	1 day
				MOD_PRLQA	MOD29PGD, MOD29PGN	MODLM_QA		
PGE16 Level 2 and Level 3 Land Surface Temperature	Period Specification, Advanced Temporal, Min. # of Granules	2,3	MODAPS	MOD_PR11	MOD021KM, MOD03, MOD35_L2, MOD07_L2, MOD10_L2, MOD12Q1, MOD11LCV, MOD11LUW	MOD11_L2,, MOD11A1, MOD11B1, MOD11UPD	1/day	1 day
				MOD_PRLQA	MOD11_L2, MOD11A1, MOD11B1	MODLM_QA		

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE17 Oceans Ancillary Meteorological Preprocess	Basic Temporal	n/a	MODAPS	MOD_PRNMC	GDAS_0ZF	MODOCNMC	4 files/day	6 hrs.
PGE18 Oceans Ancillary Reynolds Sea Surface Temperature Preprocess	Basic Temporal	n/a	MODAPS	MOD_PRREY	REYNSST	MODOCREY	1/week	1 week
PGE19 Oceans Ancillary Ozone Preprocess	Basic Temporal	n/a	MODAPS	MOD_PROZN	OZONEEP	MODOCOZN	1 file/day	1 day
PGE20 Level 3 Daily Oceans Interim	Period Specification, Data Day, Runtime Parameters	3	MODAPS	MOD_PRmtbin	MODSQBrr ¹ , MODOCBnn ¹ , MODOQBqq ¹ , MOD28Bmm ¹ , MODOCB	MODOCFnn ¹ , or MOD28Fmm ¹ ,	40 Ocean params /day + 35 QA params /day	1 day
				MOD_PRmtbin	MODOCFnn ¹ or MOD28Fmm ¹ , MODOCB	MODOCAnn ¹ MOD28Amm ¹ , MODOQAqq ¹ , or MODSQArr ¹		
				MOD_PRmspc	MODOCAnn ¹ or MOD28Amm ¹ , MODOCSPC, MODOQAqq ¹ or MODSQArr ¹	MODOCFnn ¹ or MOD28Fmm ¹		
				MOD_PRmmap	MODOCFnn ¹ or MOD28Fmm ¹ , MODOCMAP	MO{04,36}{M,S,N,Q,F,1,2,3} A## ¹		
PGE21 Level 3 Land 8- Day Surface Reflectance	Period Start of 8 Days, "Smart" Start of Year, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR09A	MODPTHKM, MODPTQKM, MOD09GHK, MOD09GQK, MOD09GST, MODMGGAD	MOD09A1, MOD09A1C, MOD09Q1, MOD09Q1C, MOD_SS	338 tiles/ 8 days	8 day
				MOD_PRLQA	MOD09A1, MOD09Q1	MODLM_QA		

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE22 Level 3 Daily Aggregation	Period Specification, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PRAGG	MOD09GHK, MOD09GQK, MOD09GST, MODPTHKM, MODPTQKM, MODMGGAD	MODAGAGG, MODAGTEX, MOD_SS	338 tiles/day	1 day
				MOD_PRLQA	MODAGAGG, MODAGTEX	MODLM_QA		
PGE23 Level 3 16-Day Bi-Directional Reflectance Distribution Function/ BARS	Period Start of 16 Days, "Smart" Start of Year, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR43B	MODAGAGG, MOD43LUA, MOD43LUP, MOD43LUT	MOD43B1, MOD43B2, MOD43B3, MOD43B4, MOD_SS, MOD43B1C, MOD43B3C, MOD43B4C	338 tiles / 16 days	16 day
				MOD_PRLQA	MOD43B1, MOD43B2, MOD43B3, MOD43B4	MODLM_QA		
PGE24 Level 3 16-Day Bi-Directional Reflectance Distribution Function/Albedo CMG	Period Start of 16 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR43C	MOD43B1, MOD43B2	MOD43C1	1 / 16 days	16 day
				MOD_PRLQA	MOD43C1	MODLM_QA		
PGE25 Level 3 16-Day Vegetation Indices 250m and 500m	Period Start of 16 Days, "Smart" Start of Year, Lat/Long Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR13A1	MOD09GHK, MOD09GQK, MOD09GST, MODPTQKM, MODPTHKM, MODMGGAD	MOD13A1, MOD13Q1, MOD_SS, MOD13A1C	338 tiles /16 days	16 day
				MOD_PRLQA	MOD13A1, MOD13Q1	MODLM_QA		
PGE26 Level 3 Monthly Vegetation Indices 1km	Period Specification, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR13A3	MOD13A2	MOD13A3	338 tiles/month	1 month
				MOD_PRLQA	MOD13A3	MODLM_QA		

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE27 Level 3 16-Day Vegetation Indices CMG	Period Start of 16 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR13C2	MOD13A2	MOD13C2	1 / 16 days	16 day
				MOD_PRLQA	MOD13C2	MODLM_QA		
PGE28 Level 3 Monthly Vegetation Indices CMG	Period Specification, Min. # of Granules	3	MODAPS	MOD_PR13C3	MOD13A3	MOD13C3	1/month	1 month
				MOD_PRLQA	MOD13C3	MODLM_QA		
PGE29 Level 3 Daily and 8-Day Thermal Anomalies/Fire	Period Start of 8 Days, "Smart" Start of Year, Meta. Based Query, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR14A	MOD14GD, MOD14GN	MOD14A1, MOD14A2, MOD_SS	338 tiles/days	8 day
				MOD_PRLQA	MOD14A1, MOD14A2	MODLM_QA		
PGE30 Level 2 Thermal Anomalies/Fire	Basic Temporal Runtime Parameters, Min. # of Granules	2	MODAPS	MOD_PR14	MODO21KM, MOD03	MOD14, MOD14CRS	288 granules/day	5 min
				MOD_PRLQA	MOD14	MODLM_QA		
PGE31 Level 3 8-Day Land Surface Temperature	Period Start of 8 Days, "Smart" Start of Year, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR11A	MOD11A1	MOD11A2	338 tiles/8 days	8 day
				MOD_PRLQA	MOD11A	MODLM_QA		
PGE32 Level 3 Daily Land Surface Temperature CMG	Period Specification, Min. # of Granules	3	MODAPS	MOD_PR11C	MOD11A1, MOD11B1	MOD11C1	1/day	1 day
				MOD_PRLQA	MOD11C1	MODLM_QA		

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE33 Level 4 Daily Leaf Area Index/FPAR	Period Specification, Lat/Long Tiling, Runtime Parameters, Min. # of Granules, Advanced Temporal	4	MODAPS	MOD_PR15A1	MOD15LUT, MODAGAGG, MOD12Q1 (previous)	MOD15A1, MOD15A1C, MOD_SS, Temporary file	338 tiles/days	1 day
				MOD_PRLQA	MOD15A1	MODLM_QA		
PGE34 Level 4 8-Day Leaf Area Index/PFAR	Period Start of 8 Days, "Smart" Start of Year, Lat/Lon Tiling, Runtime Parameters, Min.#.of.Granules	4	MODAPS	MOD_PR15A2	MOD15A1	MOD15A2, MOD15A2C, MOD_SS, Temporary file	338 tiles/8 days	8 day
				MOD_PRLQA	MOD15A2	MODLM_QA		
PGE35 Level 3 16-Day Vegetation Indices 1km	Period Start of 16 Days, "Smart" Start of Year, Lat/Lon Tiling, Runtime Parameters, Min.#.of.Granules	3	MODAPS	MOD_PR13A2	MODAGAGG	MOD13A2, MOD13A2C, MOD_SS	338 tiles/16 days	16 day
				MOD_PRLQA	MOD13A2	MODLM_QA		
PGE36 Level 4 Daily Net Photosynthesis	Period Specification, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	4	MODAPS	MOD_PR17A1	MOD17A1 (Update), MOD15A2, MOD12Q1, MOD17LUT, DLLAXMNT	MOD17A1, (Update) MOD17APS	338 tiles/day	1 day
				MOD_PRLQA	MOD17A1	MODLM_QA		

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE37 Level 4 8-Day Net Photosynthesis	Period Start of 8 Days, "Smart" Start of Year, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	4	MODAPS	MOD_PR17A2	MOD17A1, (Update) MOD15A2, MOD12Q1, MOD17LUT	MOD17A2, MOD17A2C, MOD17A1 (Update)	338 tiles/8 days	8 day
				MOD_PRLQA	MOD17A2 (Update)	MODLM_QA		
PGE38 Level 4 Yearly Net Primary Production	Period Specification, Lat/Lon Tiling, Runtime Parameters, Advanced Temporal, Optional Inputs, Min. # of Granules	4	MODAPS	MOD_PR17A3	MOD17A1, (Update) MOD17LUT, MOD15A2, MOD12Q1	MOD17A3, MOD17A3C, MOD17A1 (Update)	338 tiles/year	1 year
				MOD_PRLQA	MOD17A3	MODLM_QA		
PGE39 Level 4 8-Day Net Photosynthesis CMG	Period Start of 8 Days, "Smart" Start of Year, Min. # of Granules	4	MODAPS	MOD_PR17C2	MOD17A2	MOD17C2	1 / 8 days	8 day
				MOD_PRLQA	MOD17C2	MODLM_QA		
PGE40 Level 3 32-Day Land Cover	Period Start of 32 Days, "Smart" Start of Year, Optional Inputs, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR12M	MOD13A2, MOD11A2, MOD43B4, MODAGTEX, MOD43B1	MOD12M, MOD_SS	338 tiles/32 days	32 day
				MOD_PRLQA	MOD12M	MODLM_QA		

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE41 Level 3 96-Day Land Cover Quarterly	Days, "Smart" Start of Year, Advanced Temporal, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR12Q	MOD12M, MOD12LUT, MOD12Q1 (previous), MOD12Q2 (Previous, Future)	MOD12Q1, MOD12Q2 (Future), MOD12Q1C, MOD_SS	338 tiles/96 days	96 day
				MOD_PRLQA	MOD12Q1, MOD12Q2 (Future)	MODLM_QA		
PGE42 Level 3 96-Day Land Cover Quarterly CMG	Period Start of 96 Days, "Smart" Start of Year, Min. # of Granules	3	MODAP S	MOD_PR12C	MOD12Q1, MOD12Q2 (Future)	MOD12C1, MOD12C2 (Future)	1 / 96 days	96 day
				MOD_PRLQA	MOD12C1, MOD12C2 (Future)	MODLM_QA		
PGE43 Level 3 Daily Snow Cover	Period Specification, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR10A1	MOD10L2G, MODMGGAD, MODPTHKM	MOD10A1, MOD_SS	338 tiles/day	1 day
				MOD_PRLQA	MOD10A1	MODLM_QA		
PGE44 Level 3 Daily Sea Ice Extent	Period Specification, Meta. Based Query, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR29A1	MOD29PGD, or MOD29PGN, MODPTPGD, or MODPTPGN, MODMGPGD or MODMGPGAN	MOD29P1D or MOD29P1N, MOD_SS	130 tiles/day	1 day
				MOD_PRLQA	MOD29P1D or MOD29P1N	MODLM_QA		
PGE 45 Level 3 8-Day Snow Cover	Period Start of 8 Days, "Smart" Start of Year, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR10A2	MOD10A1	MOD10A2, MOD_SS	338 tiles/8 days	8 day
				MOD_PRLQA	MOD10A2	MODLM_QA		
PGE46 Level 3 Daily Snow Cover CMG	Period Specification, Min. # of Granules	3	MODAPS	MOD_PR10C1	MOD10A1, MOD10LUT	MOD10C1	1/day	1 day
				MOD_PRLQA	MOD10C1	MODLM_QA		

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE47 Level 3 8-Day Sea Ice Extent	Period Start of 8 Days, "Smart" Start of Year, Meta. Based Query, Lat/Lon Tiling, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PR29A2	MOD29P1D or MOD29P1N	MOD29P2D or MOD29P2N	130 tiles/8 days	8 day
				MOD_PRLQA	MOD29P2D or MOD29P2N	MODLM_QA		
PGE48 Level 3 Daily Sea Ice Extent CMG	Period Specification, Meta. Based Query, Min. # of Granules	3	MODAPS	MOD_PR29C1	MOD29P1D or MOD29P1N	MOD29C1D or MOD29C1N	1/day	1 day
				MOD_PRLQA	MOD29C1D or MOD29C1N	MODLM_QA		
PGE49 Level 3 8-Day Oceans Interim	Period Start of 8 Days, "Smart" Start of Year, Data Day, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PRmtbin	MODOCAnn ¹ or MOD28Amm ¹ , MODOCB	MODOCEnn ¹ or MOD28Emm ¹	40 params /8 days	8 day
PGE50 Level 3 24-Day Oceans Reference	Period Start of 8 Days, "Smart" Start of Year, Advanced Temporal, Data Day, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PRmtbin	MODOCEnn ¹ or MOD28Emm ¹ , MODOCB	MODOCFnn ¹ or MOD28Fmm ¹	40 params /8 days	8 day
				MOD_PRmfill	MODOCFnn ¹ or MOD28Fmm ¹ , MODOCMSK	MODOCRnn ¹ or MOD28Rmm ¹		

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE51 Level 4 8-Day and Running Yearly Oceans Productivity Indices	Period Start of 8 Days, "Smart" Start of Year, Optional Inputs, Data Day, Runtime Parameters, Min. # of Granules, Advanced Temporal	4	MODAPS	MOD_PR27W	MODOCW23, MODOCW27, MOD28WD1, MOD27LUT, FNMOC_ML, DLLAXMNT	MOD27W, MOAPWax ² , MOAPWBxx ² , MOAPW1xx ²	1 / 8 days	8 day
				MOD_PR27Y	MOD27W (current), MOD27W (all previous year)	MOD27Y, MOAPYay ² , MOAPYBy ² , MOAPY1y ²		
PGE52 Level 4 8-Day Oceans Chlorophyll Running Year Average and Annual Empirical Productivity	Period Start of 8 Days, "Smart" Start of Year, Data Day, Runtime Parameters	4	MODAPS	MOD_Prmtdbin	MODOCW27, MODOC7B	MODOCY27, MODOCF ₂₇ (Temporary)	1 / 8 days	8 day
				MOD_PR27HV	MODOCY27	MOD27HV, MOSPYAzz ² , MOSPYBzz ² , MOSPY1zz ²		
PGE53 Level 3 Daily Oceans	Period Specification, Advanced Temporal, Data Day, Runtime Parameters	3	MODAPS	MOD_Prmcloud	MODOCAnn1 or MOD28Amm1, MODOCRnn1 or MOD28Rmm1	MODOCDnn ¹ or MOD28Dmm ¹	40 Ocean params /day	1 day
				MOD_Prmspc	MODOCDnn1 or MOD28Dmm1, MODOCSPC	MODOCFnn ¹ or MOD28Fmm ¹		
				MOD_Prmmap	MODOCFnn1 or MOD28Fmm1, MODOCMAP	MO{04,36,1D}{M,S,N,Q,F,1,2,3}D## ²		

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE54 Level 3 8-Day Oceans	Period Start of 8 Days, "Smart" Start of Year, Data Day, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_PRmtbin	MODOCNnn1 , or MOD28Dmm1 , MODOCB	MODOCWnn1 or MOD28Wmm1	40 Ocean params/ 8 days	8 day
				MOD_PRmspc	MODOCWnn1 , or MOD28Wmm1, MODOCSPC	MODOCFnn1 , or MOD28Fmm1		
				MOD_Prmmap	MODOCFnn1 or MOD28Fmm1, MODOCMAP	MO{04,36,1D}{M,S,N,Q,F,1,2,3}W## ²		
PGE55 Level 3 Daily Clear Sky (Future)	Period Specification, Advanced Temporal, Min. # of Granules	3	MODAPS	MOD_PRCR	MODCSR_G, MODCSR_D	MODCSR_D, MODCSR_8	1/day	1 day
PGE56 Level 3 Daily Atmosphere	Period Specification, Min. # of Granules	3	MODAPS	MOD_PR08D	MOD08_TL, MOD08TLH	MOD08_D3, MOD08D3H	1/day	1 day
PGE57 Level 3 Monthly Atmosphere	Period Specification, Min. # of Granules	3	MODAPS	MOD_PR08M	MOD08_D3	MOD08_M3	1/ calendar month	1 calendar month
PGE58 Level 3 8-Day Land Surface Temperature CMG	Period Start of 8 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR11C2	MOD11A2	MOD11C2	1 / 8 days	8 day
				MOD_PRLQA	MOD11C2	MODLM_QA		
PGE59 Level 3 32-Day Land Surface Temperature CMG	Period Start of 32 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR11C3	MOD11A2	MOD11C3	1 / 32 days	32 day
				MOD_PRLQA	MOD11C3	MODLM_QA		

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE60 Geolocation Control Point	Basic Temporal, Optional Inputs	2	MODAPS	MOD_PR03CP	MOD02HKM, MOD02QKM, MOD03, MOD35_L2, MOD10_L2, MOD29, MODCPLUT	MOD03CP	288 granules/day	5 min
PGE61 Level 4 Yearly Vegetation Continuous Fields	Period Specification Lat/Long Tiling, Runtime parameters Min. # of Granules	2	MODAPS	MOD_PR44B	MOD44CQ, MOD44CH	MOD44B	338 tiles/year	1 year
				MOD_PRLQA	MOD44B	MODLM_QA		
PGE62 Level 3 32-Day Thermal Anomalies/Fire CMG	Period Start of 32 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR14C	MOD14A1	MOD14C3	1 / 32 days	32 day
				MOD_PRLQA	MOD14C3	MODLE_QA		
PGE63 Level 4 Monthly Leaf Area Index /FPAR CMG	Period Specification "Smart" Start of Year, Min. # of Granules	4	MODAPS	MOD_PR15CM	MOD15A2	MOD15C2	1/ month	1 month
				MOD_PRLQA	MOD15C2	MODLM_QA		
PGE64 Level 4 Yearly Net Primary Production CMG	Period Specification, Min. # of Granules	4	MODAPS	MOD_PR17C3	MOD17A3	MOD17C3	1/year	1 year
				MOD_PRLQA	MOD17C3	MODLM_QA		

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

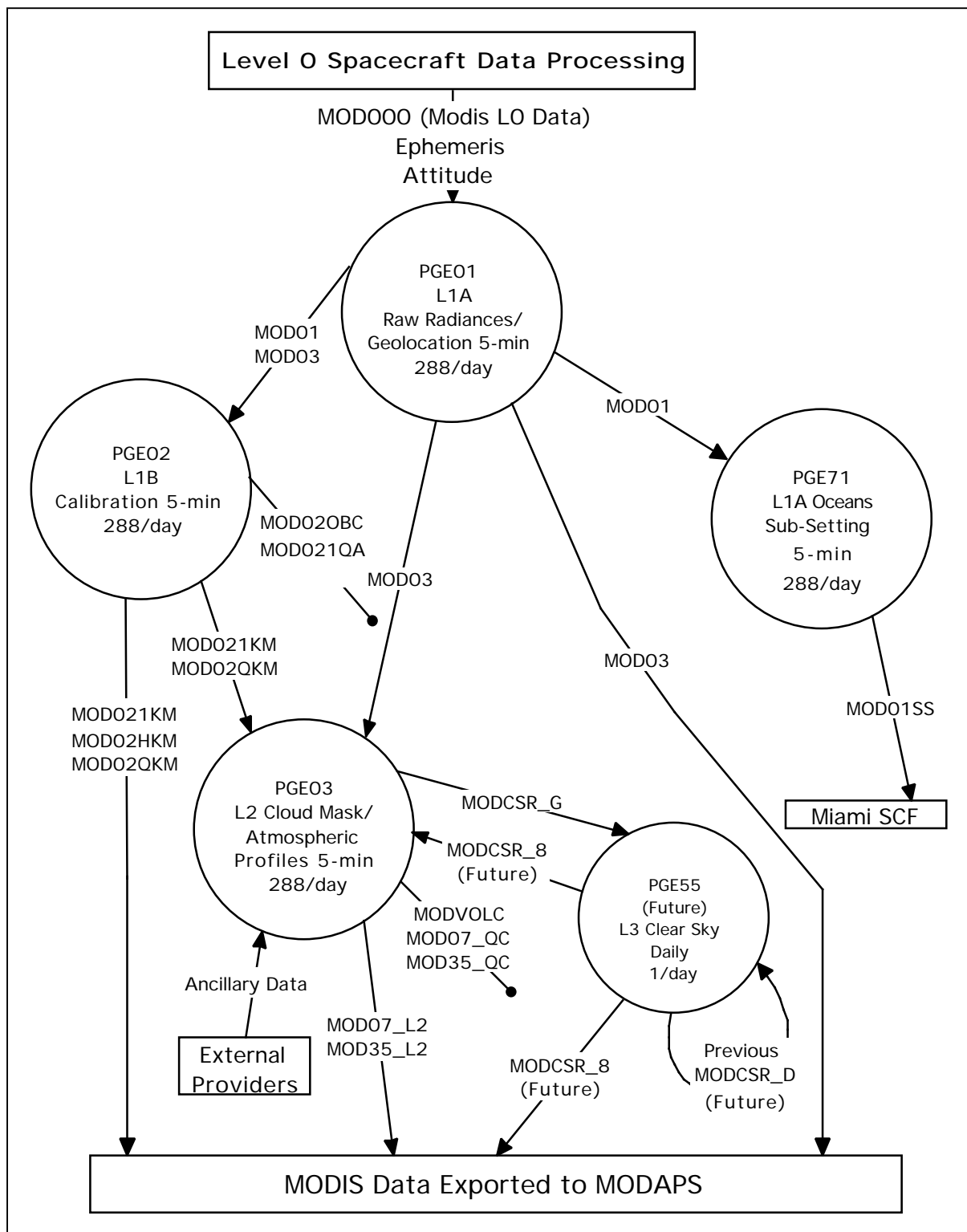
PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE65 Level 3 32-Day Bi-Directional Reflectance Distribution Function/Albedo CMG	Period Start of 32 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR43C	MOD43B1, MOD43B2	MOD43C2	1 / 32 days	32 day
				MOD_PRLQA	MOD43C2	MODLM_QA		
PGE66 Level 4 32-Day Vegetation Cover Conversion 250m	Period Start of 32 Days, "Smart" Start of Year, Advanced Temporal, Optional Inputs, Meta. Based Query, Lat/Long Tiling, Runtime Parameters Min. # of Granules	4	MODAPS	MOD_PR44A	MOD44CQ, MOD44LUT	MOD44A	338 tiles /32 days	32 day
				MOD_PRLQA	MOD44A	MODLM_QA		
PGE67 Level 3 8-Day Snow Cover CMG	Period Start of 8 Days, "Smart" Start of Year, Min. # of Granules	3	MODAPS	MOD_PR10C2	MOD10A2	MOD10C2	1 / 8 days	8 day
				MOD_PRLQA	MOD10C2	MODLM_QA		
PGE68 Level 3 8-Day Sea Ice Extent CMG	Period Start of 8 Days, "Smart" Start of Year, Meta. Based Query, Min. # of Granules, Zonal Tiling	3	MODAPS	MOD_PR29C2	MOD29P2D or MOD29P2N	MOD29C2D or MOD29C2N	1 / 8 days	8 day
				MOD_PRLQA	MOD29C2D or MOD29C2N	MODLM_QA		
PGE69 Level 3 Daily Atmosphere Zonal Tiling	Period Specification, Meta. Based Query, Min. # of Granules	3	MODAPS	MOD_PR08T	MOD04_L2, MOD05_L2, MOD06_L2, MOD07_L2	MOD08_TL, MOD08TLH	36 tiles/day	1 day

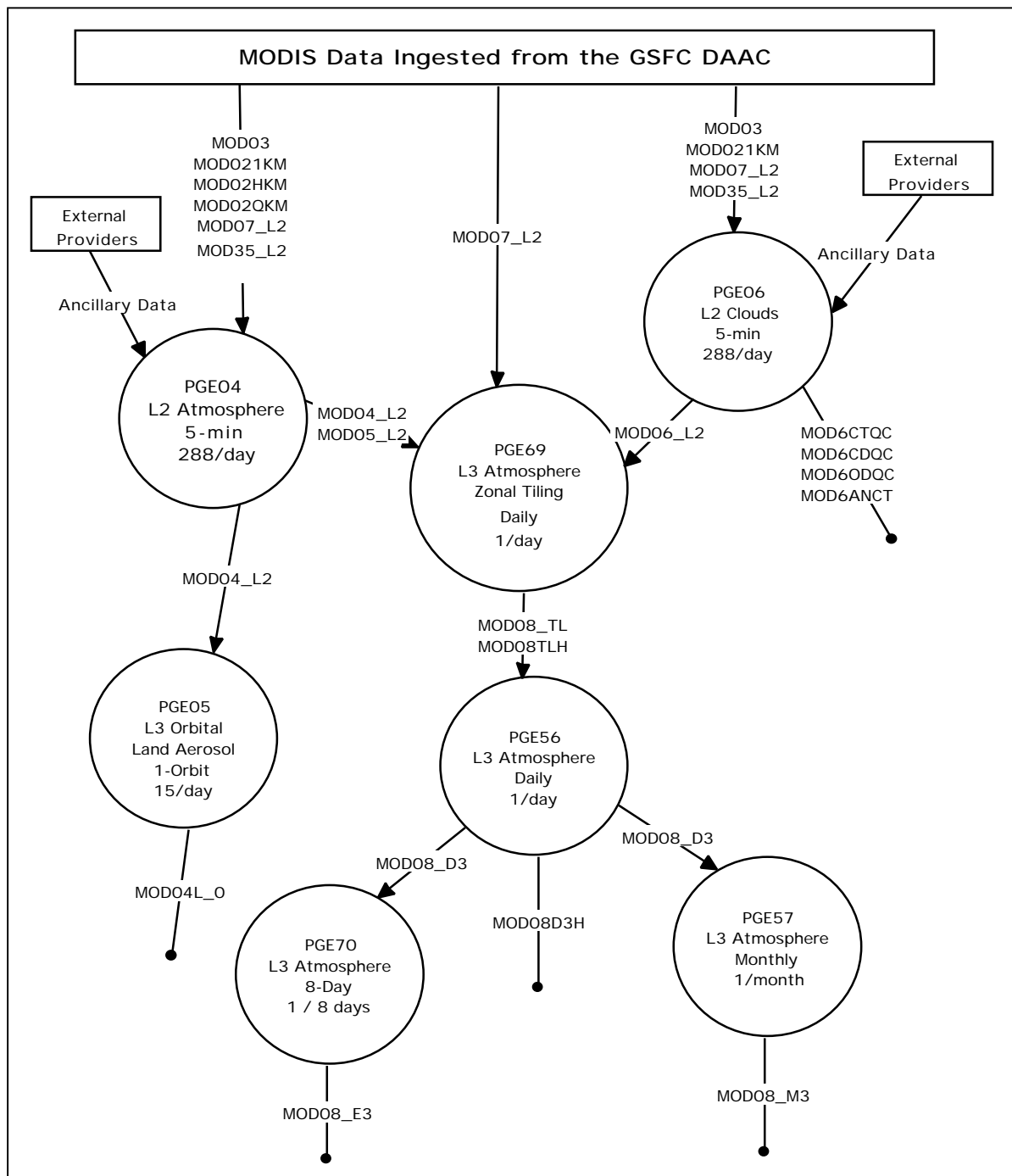
Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

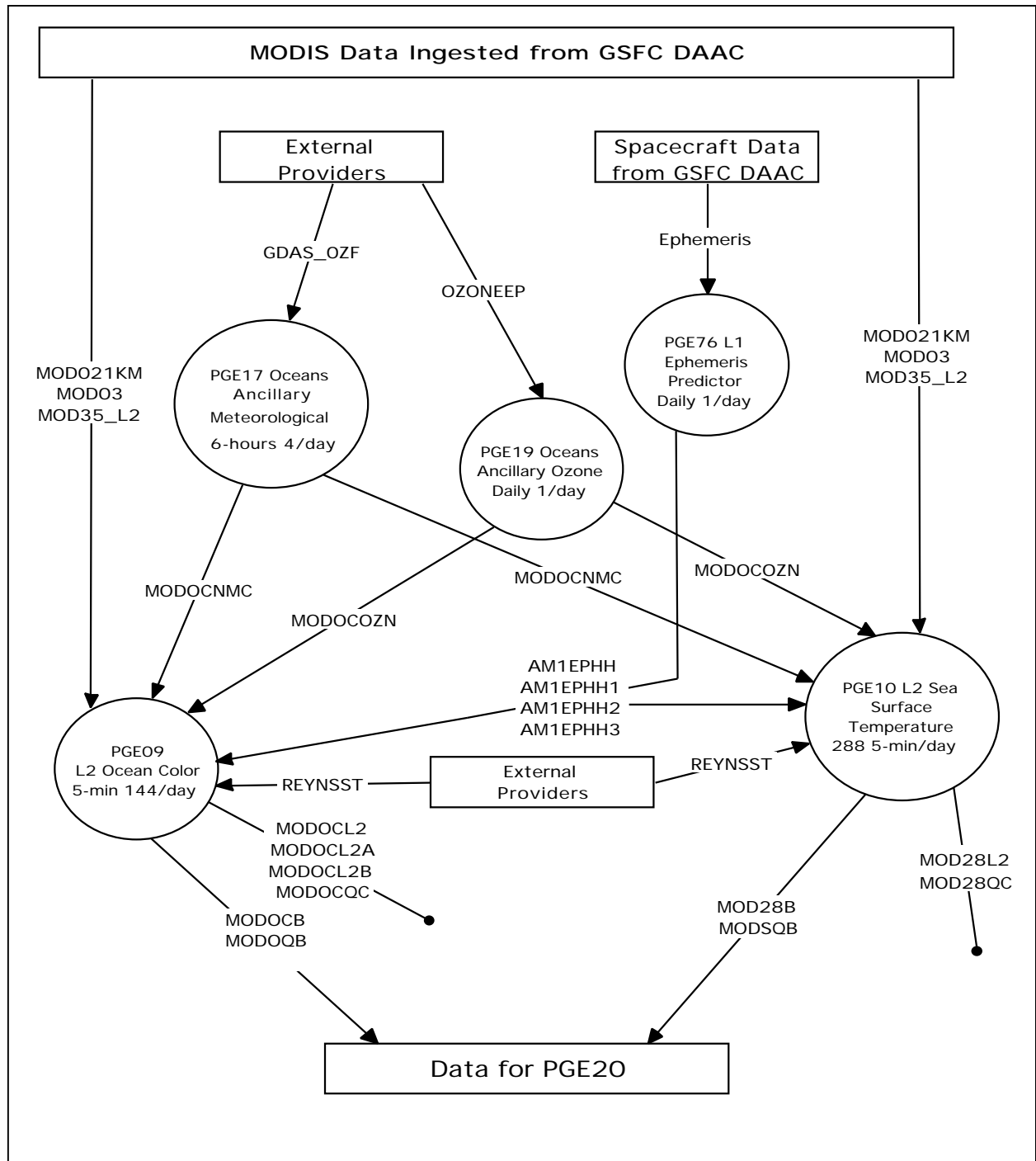
PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE70 Level 3 8-Day Atmosphere	Period Start of 8 Days, Min. # of Granules	3	MODAPS	MOD_PR08E	MOD08_D3	MOD08_E3	1 / 8 days	1 day
PGE71 Level 1A Oceans Sub-Setting	Basic Temporal	1A	GSFC	MOD_PR01SS	MOD01	MOD01SS	288 granules/day	5 min
PGE72 Level 4 16-Day Vegetation Intermediate Composite	Period Start of 16 Days, "Smart" Start of Year, Optional Input, Lat/Long Tiling Runtime Parameters Min. # of Granules	4	MODAPS	MOD_PR44C	MODPTQKM, MOD09GQK, MODMGGAD, MOD09GST, MODPTHKM, MOD09GHK, MOD14GD, MOD11A1	MOD44CQ, MOD44CH, MOD44CT	338 tiles/16 days	16 day
				MOD_PRLQA	MOD44LQ, MOD44CH, MOD44CT	MODLM_QA		
PGE73 Level 3 Monthly Oceans	Period Specification, Advanced Temporal, Data Day, Runtime Parameters, Min..# of Granules	3	MODAPS	MOD_Prmtdbin	MODOCDDnn1, MODOCWnn1, MOD28Dmm1, MOD28Wmm1, MODOCDB	MODOCMnn1, MOD28Mmm1	40 Ocean params/month	1 month
				MOD_Prmtdspc	MODOCMnn1 or MOD28Mmm1, MODOCSPC	MODOCFnn1 or MOD28Fmm1		
				MOD_Prmtdmap	MODOCFnn1, or MOD28Fmm1,, MODOCMAP	MO{04,36,1D}{M,S,N,Q,F,1,2,3}M## ²	40 Ocean params/month	1 month

Table 3-2. MODIS SDP S/W PGEs, Production Rules, and Data Files (Con't)

PGE Name	Rules	Lev	Site	Process	ESDT Input	ESDT Output	Runs	Period
PGE74 Level 3 Yearly Oceans	Period Specification, Data Day, Runtime Parameters, Min. # of Granules	3	MODAPS	MOD_Prmtbin	MODOCMnn1 or MOD28Mmm1, MODOC ² TB	MODOCNnn ¹ or MOD28Nmm ¹	40 Ocean params/ year	1 year
				MOD_PRmspc	MODOCNnn1 or MOD28Nmm1, MODOCSPC	MODOCFnn ¹ or MOD28Fmm ¹		
				MOD_PRmmap	MODOCFnn ¹ or MOD28Fmm ¹ , MODOCMAP	MO{04,36,1D}{M,S,N,Q,F,1,2,3}N## ²		
PGE75 Land Snow and Sea Ice Albedo, Reserved for Future								
PGE76 Level 1 Daily Ephemeris Predictor	Basic Temporal Advanced Temporal, Runtime Parameters	1	MODAPS	MOD_PRpred	AM1EPHN0	AM1EPHH, AM1EPHH1, AM1EPHH2, AM1EPHH3	1/day	1 day

**Figure 3-3 Level 1 Processing at the GSFC DAAC**

**Figure 3-4 Atmosphere Processing at MODAPS**

**Figure 3-5 Oceans L2 Processing at MODAPS**

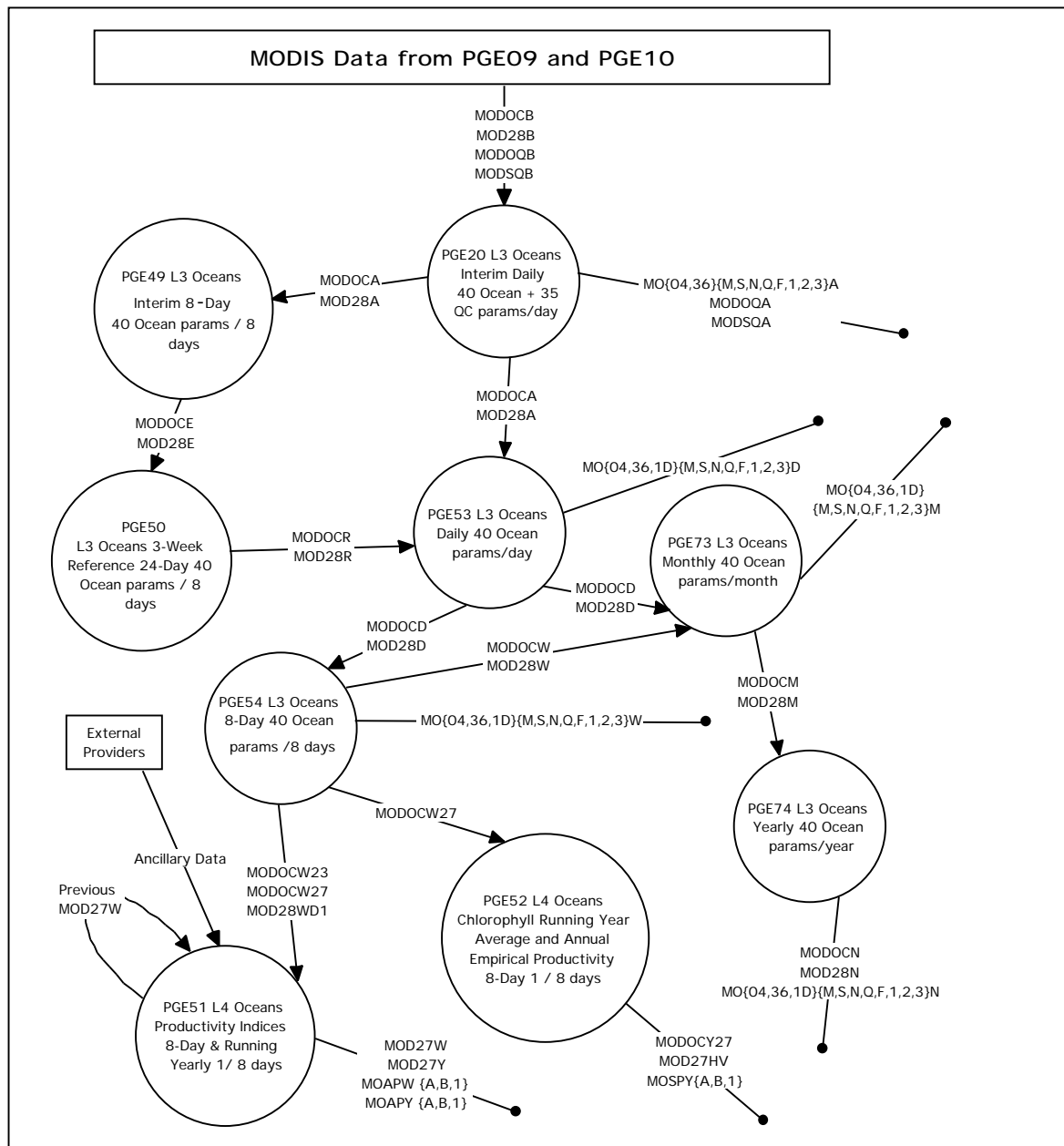


Figure 3-6 Oceans L3 and L4 Processing at MODAPS

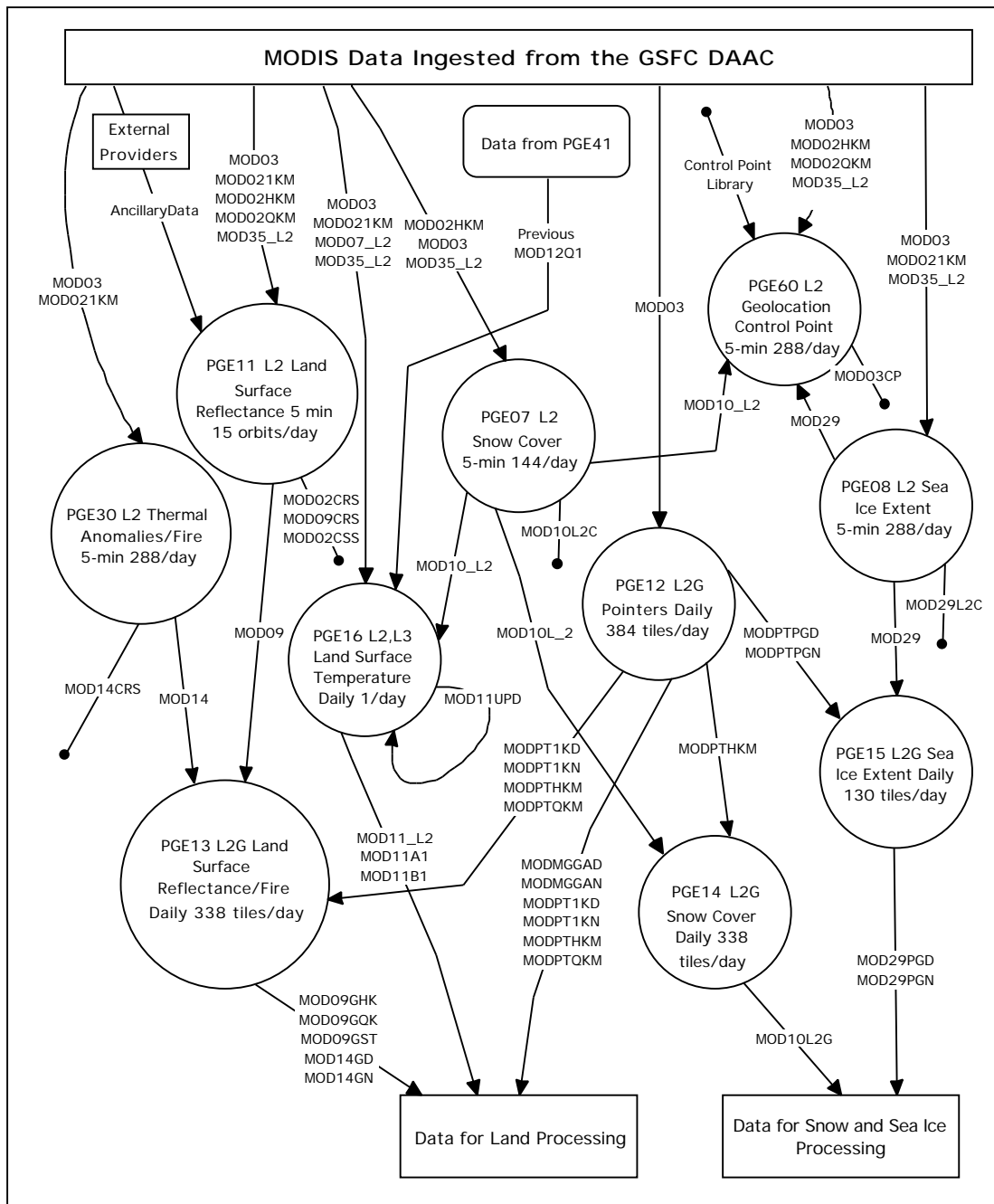


Figure 3-7 Level 2 and Level 2G Land Processing at MODAPS



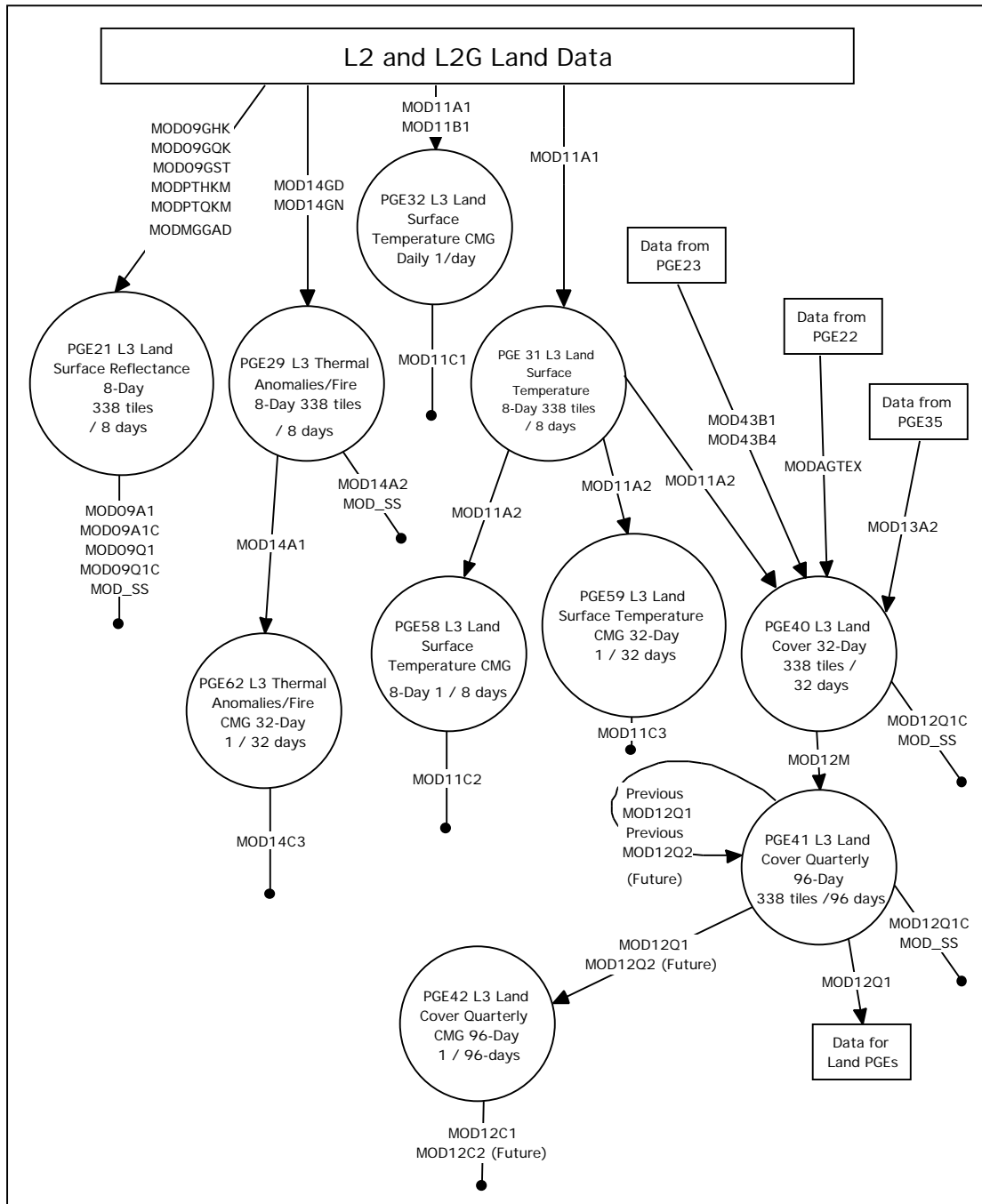


Figure 3-9 Level 3 Land Processing at MODAPS (Con't)

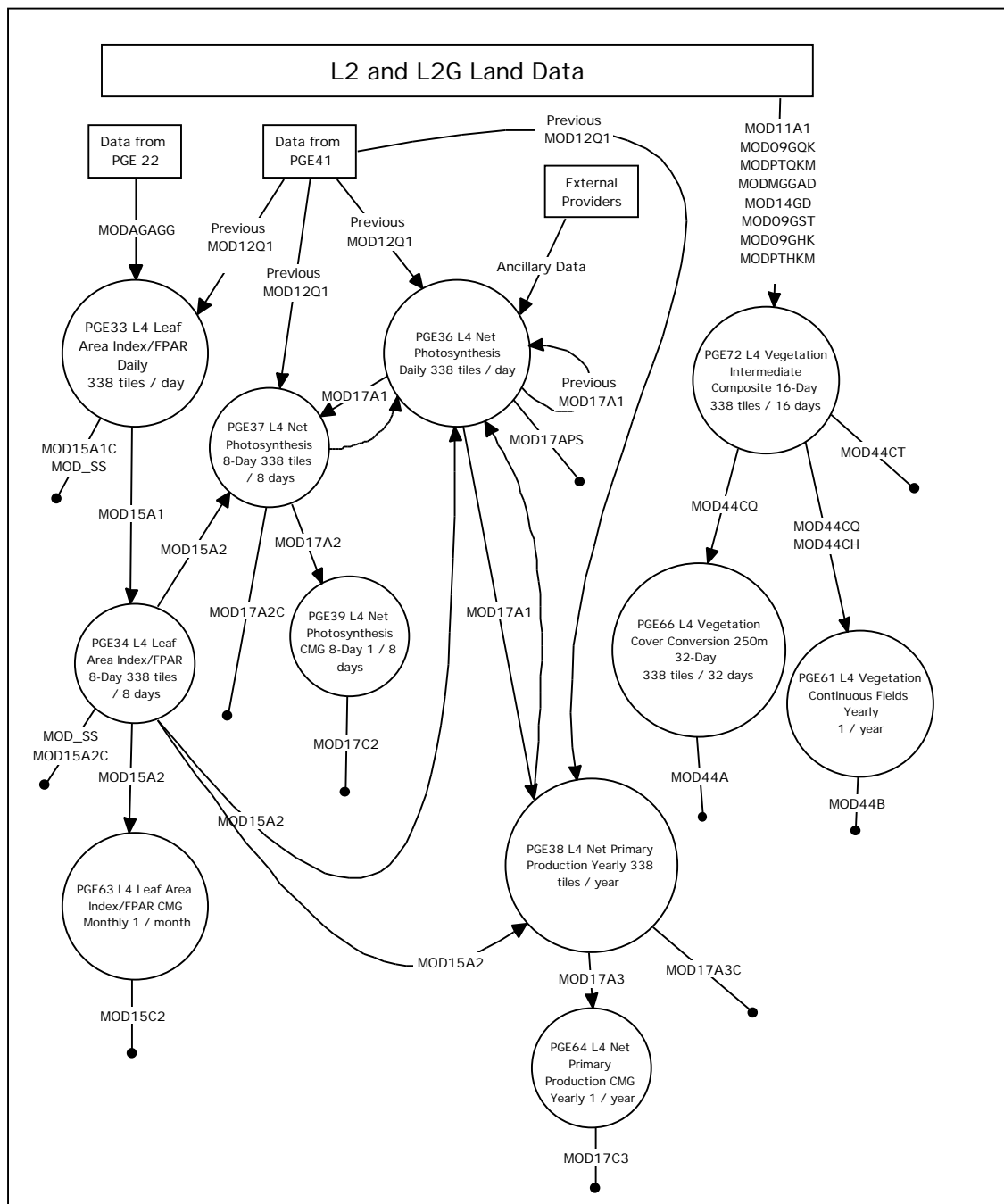


Figure 3-10 Level 4 Land Processing at MODAPS

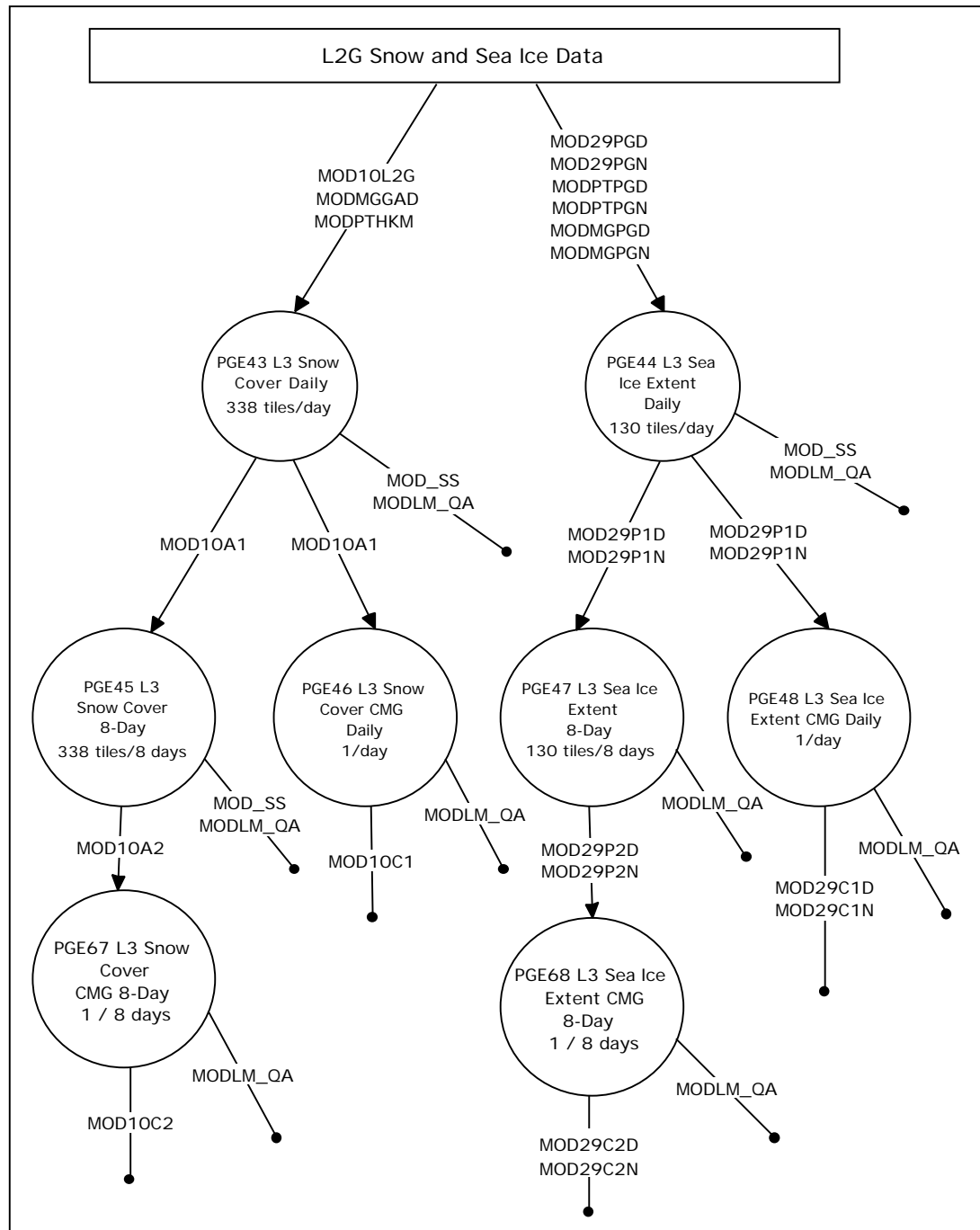


Figure 3-11 Level 3 Snow and Sea Ice Processing at MODAPS

3.2.4 PGE Profiles

Some of the MODIS PGEs may be run in multiple ways to produce different output products. The same code is used for the process or processes within the PGE. However, the input products as well as the output products will generally be different. The automated data processing system must be able to recognize the different ways of running the PGE, stage the proper inputs, and produce the proper outputs. MODAPS and ECS perform this function by associating different PGE profiles for each variation of the PGE.

The multiple Level 1 PGE profiles must be registered at SSI&T at the GSFC DAAC and L2, L3, and L4 PGE profiles must be installed at MODAPS. Each PGE profile has its own Process Control File (PCF) which contains the various input and output data types, different runtime parameters, and possibly different numbers of input and output files. The ECS SDPS treats these PGE profiles as if they were different PGEs when they are executed in production. MODAPS also runs the PGE profiles separately.

Operational Scenario

The following sections will describe the environment, interfaces, and processing scenarios.

Environment

The following subsections describe the ECS environment and the MODIS-Application Program Interface (M-API).

ECS Interfaces

The MODIS SDP S/W is designed to run under control of the ECS SDPS. The EOS Project has provided to the MODIS Science Data Support Team (SDST) an SDP Toolkit (SDPTK) that isolates the science software from hardware, system, and language interface library dependencies of the ECS SDPS environment. Any access to DAAC data staging areas to retrieve or store data is managed by an SDPTK call issued from the MODIS SDP S/W to the SDPS. The SDPTK is implemented in two versions: a Science Computing Facility (SCF) version and an ECS SDPS version for use in the DAACs. The SDPTK provides a library of callable functions and subroutines including generic Input/Output (I/O), Status Message Facility (SMF), and PCF support. The SDPTK was integrated into the

Science Team Member (STM)-supplied software in preparation for delivery to the DAAC.

M-API Interface

In addition to the SDP Toolkit interface to the ECS SDPS environment, MODIS SDP S/W has a customized M-API. The information on M-API is based on the M-API User's Guide, Version 2.3. M-API was developed by the MODIS SDST for both reading and writing science data sets associated with land, ocean, and atmosphere algorithms.

All standard products for EOSDIS are required to be written in Hierarchical Data Format (HDF). HDF is a self-describing format developed by the National Center for Supercomputing Applications (NCSA). M-API is available to scientists and programmers who are building algorithm-based software and delivering MODIS code to the ECS.

M-API is designed to simplify the process of reading the L1B radiance bands and higher level science data in HDF and for writing products and metadata to the HDF files. In addition, M-API includes the interfaces to HDF-EOS files, which were specifically designed and developed for the ECS to contain data in the swath, grid, and point structures. M-API shields the users from the low-level details of HDF so that they can focus on their science algorithms. At the same time, M-API allows enough flexibility for users to customize the structures of the HDF output to meet their own research needs. M-API handles the generation of low-level objects with HDF and efficiently organizes them to facilitate access to their contents by other software. M-API is delivered as a software library by the same process as the PGEs to the DAACs for use with the MODIS science software.

Data Interfaces

The MODIS SDP S/W requires the following external data as input:

- MODIS Level 0 data, transmitted to the GSFC DAAC.
- Spacecraft data, transmitted to the GSFC DAAC, ingested by the SDPS, and made available to processing software via the SDP Toolkit. The primary specific spacecraft data sets required by MODIS are the attitude and ephemeris. The SDP Toolkit also requires the leap second and UTC

conversion files. External data sets include the planetary ephemeris data from Jet Propulsion Laboratory (JPL).

- Ancillary data, both static and dynamic. The specific ancillary data required by each PGE are included with the PGE descriptions in Section 4. The sources of the ancillary data are either external data producers [i.e., the National Center for Environmental Prediction (NCEP), the Atmospheric Chemistry Group at GSFC, the National Snow Ice Data Center (NSIDC), and the Data Assimilation Office (DAO)] or the software developers.

All of these data are acquired and archived at the DAACs. In addition, all MODIS processes beyond L1A require MODIS products as input. The specific data required for each PGE are staged by the SDPS for execution of the PGE.

The MODIS SDP S/W produces the following outputs:

- MODIS standard products, which are archived and inventoried at the designated DAAC, as defined in the V2 Requirements Specification
- MODIS interim products, which are archived and inventoried either at the GSFC DAAC for a short period of time or at MODAPS
- QA products, which are transmitted to the appropriate SCF
- ASCII metadata files for all products
- Log status files and production histories that are saved in the processing log for each PGE run at the GSFC DAAC and MODAPS.
- Temporary files that are deleted after the software execution is completed.

All of the outputs are managed by the SDPS following completion of each PGE.

Processing Scenarios

When the MODIS Instrument and the SDPS were stabilized after the launch, a global data set of one month of all the MODIS products from the PGEs running at launch was produced for the use of the scientific community. Since data processing resources were limited for the first year of the EOS AM-1 mission, only about 25 percent of the total products were to be generated and archived at the DAACs. Each MODIS Team implemented its own reduced production scenario or modified plans for archive of selected products.

The L1 Raw Radiances, L1 Geolocation product, and L2 Cloud Masks and Atmospheric Profiles are required by MODIS Atmosphere, Ocean, and Land PGEs. Since the volumes of Level 1 and Atmosphere products are less than the volume for products from other disciplines, all of the Level 1 and Atmosphere

products are produced globally for every day of the year and are archived at the GSFC DAAC. The MODIS Oceans Team changed some Oceans products to interim products and modified their data processing software to store some data values as integers plus scaling factors to reduce the volume. The MODIS Ocean Team may produce a combination of products from a subset of the MODIS radiance bands and sub-sampled data in the future if allowable volumes are not increased. The MODIS Land Team plans to limit the products by processing data only for selected geographical regions on the Earth. The Land processing is based on tile schemes which are defined to the SDPS for use with the Land PGEs. The regions included in the plan for the MODIS PGEs are North America, South America, parts of Africa, and parts of Asia.

The following sections describe the processing scenarios for the MODIS L1, Atmosphere, Oceans, and Land PGEs.

Level 1 Processing Scenario

The MODIS L1 processing, performed at the GSFC DAAC, consists of L1A/Geolocation and L1B. This processing is initiated each time MODIS Level 0 data are received at the DAAC from EDOS.

The L1A process defines the processing granule size that is used by all subsequent L1 and L2 processing. A single Level 0 data delivery from EDOS consists of two hours (nominally) of data. For each 2-hour delivery of Level 0 data, the L1A process is executed 24 times to produce 24 five-minute L1A granules. The Geolocation process, within the same PGE, inputs each L1A granule and produces a five-minute geolocation granule. A total of 24 Geolocation granules are generated from each 2-hours of Level 0 data. In actual production, the GSFC DAAC currently runs PGE01 in 15-minute segments.

The L1B processing is then initiated using the L1A granules as input, one PGE execution per granule. These will run in parallel, within the available resources of the DAAC. The Atmosphere Cloud Mask and Profiles, run at the GSFC DAAC, are considered to be part of the Level 1 processing. These are described in the following section.

Atmosphere Processing Scenario

The MODIS Atmosphere processing consists of the L2 generation of Cloud Mask, Atmospheric Profiles, Clouds, Atmospheric Aerosols, and Total

Precipitable Water Vapor, the L3 generation of Interim Land Aerosol, and the L3 generation of combined Atmosphere products. Atmosphere Cloud Mask and Atmospheric Profiles processing is performed at the GSFC DAAC. All of the other atmosphere processing is performed at MODAPS. The L2 processing scenario is straightforward: each PGE is run once per input L1B calibrated radiance granule, also using other MODIS products as input. The L3 Interim Land Aerosol is processed by orbit for input to the Land Surface Reflectance process.

The processing begins with L2 Cloud Mask/Atmospheric Profiles, which performs ancillary data preprocessing and processes each granule of L1B and Geolocation data. This is followed by L2 Atmosphere and L2 Clouds, which are performed for every granule. Although the L2 Atmosphere processes are run on both the day and night mode granules, different processing scenarios are required. The aerosol product will not be produced at night and the total precipitable water vapor product will only contain a small amount of data at night. Upon completion of processing for all granules containing data within an orbit, the L3 Interim Land Aerosol PGE is executed on an orbital period to produce the interim Land Aerosol product.

The L3 Atmosphere processing combines the Aerosol, Water Vapor, Atmospheric Profiles, and Cloud products into a single gridded product, which is produced daily, every eight days, and monthly. The daily L3 processing is performed in two phases. The first phase uses a day of L2 products as input to produce a set of interim files based on zonal tiles. The zonal tiles consist of 36 latitude-bounded bands around the Earth, starting at the North Pole and ending at the South Pole, and each tile is written to a separate interim file. The second phase of processing is to combine these files into a single, global, daily product. The daily products are then used as input to produce the 8-day and monthly L3 products.

Ocean Processing Scenario

The Oceans Processing, performed by MODAPS, is organized around two overall product types: Ocean Color and Sea Surface Temperature (SST). The processing for the two product types differs at L2 but is essentially the same for all L3 products.

The initial Oceans processing is performed on one granule per PGE execution using L1B, Geolocation, and Cloud Mask data as input. The L2 Ocean Color processing is performed for day mode granules only, while the L2 SST processing is performed for all granules. Both PGEs perform both L2 and the first stage of L3 processing to produce L2 and granule-based L3 binned products. These PGEs perform the space binning of 36 Ocean Color parameters and separate day and night space binning of two SST parameters. The next stage of L3 processing performs the time binning of the 36 Ocean Color parameters and two SST parameters in day and night modes into the 40 interim daily L3 products. The time binning is based on the Ocean Data Day. The determination of data that fall into a Data Day is defined on the basis of equator crossing of the satellite near the international date line.

The subsequent Oceans processing is performed to aggregate the L3 binned products over progressively longer time scales of eight days and 24 days. These steps are performed initially to produce a series of interim products. Following the generation of the 24-day interim products, the steps are repeated using these products and the interim daily products as input, to produce the standard L3 products. The daily products are input to produce the 8-day weekly parameter products. The weekly products are used to produce the monthly and yearly binned Ocean Color products, the monthly and yearly binned SST products, Ocean Primary Productivity products, yearly Chlorophyll averaged products, high-variance statistical products, and Oceans Weekly Running Year average. Ocean products also include corresponding maps of some of these products at the daily, 8-day, monthly, and yearly stages of processing.

Land Processing Scenario

The Land Discipline contains the largest number and variety of science data products. Some of these are Land Surface Reflectance, Land Surface Temperature, Thermal Anomalies, Bi-directional Reflectance Distribution Function, and several land cover types. These land cover data sets include Land Cover averages over various time periods, Vegetation Continuous Fields, Vegetation Cover Conversion, Snow Cover, Sea Ice Extent, Leaf Area Indices, Fraction of Photosynthetically Active Radiation, Net Photosynthesis, and Net Primary Production. The Land Science Data Processing generates several levels of products that include granules covering several periods of observation time.

The following list shows the correspondence between product level and data period:

Level 2 Products – Five-minute swath granules

Level 2G Products - Daily pointers to granules overlapping predefined

Land tiles

Level 3 Products - Daily, 8-day, 16-day, monthly, 32-day, 96-day, and
yearly tiled granules

Level 4 Products - Daily, 8-day, 32-day, yearly tiled granules

The MODIS channels range over the spectral bands from visible to infrared. Some of the MODIS channels in the visible range are turned off at night. Many of the Land products use only day mode data. The sea ice and thermal anomalies products are separated into day and night mode. For products produced in both day and night, the PGEs may be executed once for the day mode data and once for the night mode data. The entire sequence of sea ice products is performed in this way.

Different ways of running the PGEs to produce the different types of products or different Land tiles require separate Process Control Files (PCFs) in the Science Data Processing System. Each PCF for a PGE is called a PGE Profile. Some of the Land PGEs are designed with the capability of producing more than one product per PGE execution.

During the first year of the EOS AM-1 mission, the MODIS SDP System with the associated PGE Production Rules produced global Land data sets for use by the science community. One month of the Land tiled products, starting with L2G and continuing through L3, was generated using the Integerized Sinusoidal projection and Tile Schemes covering the globe. The Sea Ice Extent products are produced using the EASE-Grid polar projection. The global tiling scheme is implemented with each version of the MODIS SDP system. Through the launch and first year of the mission, 50 percent of many of the science products were generated under the reduced production scenario.

The MODIS Land Science Data Processing begins with the generation of Level 2 Land products consisting of five minute granules of Land data created from five minute input granules of Level 1B Calibrated Radiances and L1 Geolocation. The Level 2 Land products are Land Surface Reflectance, Thermal Anomalies/Fire,

Snow Cover, Sea Ice Extent, and Land Surface Temperature. Each of the Land products are created by different Product Generation Executives (PGEs).

The L2 Land processing is similar to that for the other disciplines. One 5-minute granule of L2 product is created from one 5-minute granule of L1B Calibrated Radiance data. The L2 Land Surface Reflectance/Fire processing is performed on an orbital basis for all granules using L1B, Geolocation, and L2 Atmosphere products as input. The remaining MODIS L2 Land processes are run separately in the L2 PGEs. The L2 Snow Cover PGE is executed once for every L1B day mode granule and its corresponding Geolocation granule. The L2 Sea Ice Extent PGE is executed once for each L1B and Geolocation granule in both day and night modes. The L2/L3 Land Surface Temperature (LST) processing is also performed at this point using the L1B Calibrated Radiances at 1km resolution, Geolocation, Cloud Mask, Atmospheric Profiles, and L2 Snow Cover as input.

The transition from a swath product to a gridded, tiled product occurs at the L2G stage of Land processing. After the Level 2 products are produced, the higher level products are binned and gridded into Land Tiles in several projections and resolutions. The MODLAND Team has selected several projections and tile sizes for the MODIS Land tiling. Some of these projections are Goode's Homolosine, Lambert Azimuthal Equal-Area with projection center at the North Pole, and Lambert Azimuthal Equal-Area with projection center at the South Pole. The Integerized Sinusoidal Projection is being used in production for the Land Surface Reflectance, Thermal Anomalies/Fire, Land Surface Temperature, and Snow Cover in all versions of the MODIS SDPS System Description. At some period under the MODIS V2.2 SDP System, the Sea Ice Extent products were switched to a polar projection. The tile sizes are full, quarter, and one-sixteenth. The full size is to be used in production. The tiles selected for production may be changed over the life of the mission and new tile schemes may be defined and used.

The L2G processing begins when all of the granules for one Greenwich Mean Time (GMT) day have been processed. Some L2G PGEs require two primary profiles, one for day mode and one for night mode. All L2G PGE profiles are run once per tile; the inputs for an execution consist of all granules which overlap geographically with the specified tile for the required MODIS products. The first step in the data processing is the generation of tiles of L2G Pointers to L2 granules. Using the Pointers and Geolocation Angles, the L2G Products of

Surface Reflectance, Thermal Anomalies/Fire, Snow Cover, and Sea Ice Extent are produced. L3 and L4 tiled Land Products are created from the corresponding L2 Land products. The tiles of data are produced and stored separately throughout the entire data processing chains until the global Climate Modeling Grid (CMG) products are created.

As in the previous MODIS SDP Systems, the MODIS V3.0 SDP System will process the Land products using seven basic tile schemes based on the reduced production scenario in which regions of high priority for the Land Team are selected. These seven tile schemes correspond to the seven geographic areas for which the Land products are to be generated. The following are the seven tile schemes:

1. mland_v01_isf_na1
2. mland_v01_isf_sa1
3. mland_v01_isf_af1
4. mland_v01_isf_as1
5. mland_v01_isf_na2
6. mland_v01_isf_np1
7. mland_v01_isf_np2

where:

vo1 = Tile Scheme Version 1
isf = Integerized sinusoidal projection, full tiles
na1 = North America, region one
sa1 = South America, region one
af1 = Africa, region one
as1 = Asia, region one
na2 = North America, region two
np1 = North Pole, region one
np2 = North Pole, region two

The L3 processing for products to be archived and distributed at NSIDC consists of the daily and 8-day processing for both Snow Cover and Sea Ice Extent. Daily and 8-day PGEs are executed on a per tile basis. After the tiled products have been made, daily and 8-day CMG PGEs are executed on a global basis.

The L3 and L4 processing for products to be archived and distributed at EDC consists of separate processing streams for each product type. The primary product types are Land Cover, Bi-directional Reflectance Distribution Function

(BRDF), Leaf Area Indices (LAI)/Fraction Photosynthetically Active Radiation (FPAR), Net Primary Production (NPP), Land Surface Temperature (LST), Thermal Anomalies/Fire, Land Surface Reflectance, and Vegetation Indices. Each product is generated over progressively longer time scales. Daily, 8-day or 16-day, 32-day or monthly, quarterly, and yearly products are made on a per tile basis. CMG products are then produced on a global basis.

Some of the primary differences between the data processing in previous versions of the MODIS SDPS Systems and Version 3.0 are production of additional interim products for more detailed study of the science granules, QA, and validation. Coarse resolution, subsetted, and sub-sampled products are being made from many of the standard Land products.

All of the Land PGEs contain a common process, which will run in the PGE script after all of the other science modules in the PGE have completed operation. This common process extracts all of the metadata from each of the output product granules and writes the extracted metadata to Quality Assurance (QA) files corresponding to each output granule. These QA files are transported back to the SCFs for analysis at the completion of the PGE and can then be deleted from the system.

The following changes were made and will be described in more detail in Section 4.

- Separation of day and night mode data for Land L2G Pointers, L2G Geolocation Angles, L2G Thermal Anomalies/Fire, and a series of L2G to L3 Sea Ice products.
- Additional static runtime parameters that alter the basic products generated by the PGEs. These parameters are set in one way for production and in other ways for science analysis.

Science Data Products and Processing Files

An overview of the MODIS data products and the parameters they contain, is presented in the MODIS Data Product Catalog, found on the MODIS Administrative Support Team (MAST) World Wide Web (WWW) site at URL:

<http://modarch.gsfc.nasa.gov/MODIS/DATAPROD/dataprodcatalog.html>.

For the scientific derivation of each product, the user may consult the Algorithm Theoretical Basis Document (ATBD) for each product, located on the SPSO WWW at URL:

<http://eospso.gsfc.nasa.gov/atbd/modistables.html>.

The full details of the structure, size, and characteristics of every file produced or utilized by the MODIS SDP S/W are provided in the MODIS Processing Files Description Document.

Each file or group of files has been assigned an ESDT designation by the ECS Project in cooperation with the MODIS SDST. The MODIS ESDTs are listed in Table 3-3-1 and 3-3-2, along with a description, processing level, file-type, file name, and the MODIS process associated with the ESDTs. ESDT collections for dynamic MODIS products are described in Table 3-3-1. ESDT collections for grouping and storing static input files are described in Table 3-3-2. The Time-Varying Ancillary Data ESDTs are listed in Table 3-4. The Ancillary Data ESDTs used by the SDP Toolkit are listed in Table 3-5. The file types include P (product), S (static, e.g., LUT), Q (quality control or diagnostic output), and T (temporary). The file names consist of a complete name for all but MODIS products. An asterisk (*) listed for a MODIS product ESDT indicates the file name uses the MODIS Science Data Product Naming Convention as defined in the MODIS Version 2 Science Computing Facility Software Delivery Guide. The Oceans L3 products consist of 36 Ocean Color parameters and two Sea Surface Temperature parameters for both day and night modes. Table 3-6 lists the mapping of the L3 Oceans ESDTs to the Product Longname. The ESDTs will be used in the remainder of the document for all references to processing files. Table 3-3-1 also includes several post-launch data sets and data sets associated with future deliveries of MODIS processes (labeled in the Description column). These data sets are not described in any detail in the individual PGE descriptions in Section 4.

Table 3-3-1. MODIS Dynamic Product ESDTs

Note: (1) * = File Name uses the MODIS Science Data Product Naming Convention

(2) File Types are noted by: P = MODIS product; Q = MODIS QC product; T = Temporary product files

(3) Ocean multi-type granule ESDTs have 6 character names for the DAAC followed by 2 character extensions for MODAPS indicated by subscripts

(4) In the PGE column the following apply: O = Several Oceans PGEs; L = Several Land PGEs

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MO{04, 36}{M, S, N, Q, F, 1, 2, 3}A##	<p>MODIS/Terra Interim Ocean Color and SST QC {Mean} Maps Daily L3 Global {4km} CylEqDis {Std. Dev.} {36km} {Number} {Quality} {Common Flags} {Flag Byte 1} {Flag Byte 2} {Flag Byte 3}</p> <p>(Where: M = MODIS O = Oceans {04, 36} = resolution and size: 04 = 4 km 36 = 36 km {M, S, N, Q, F, 1, 2, 3} = values mapped: M = Mean S = Standard deviation N = Number of observations Q = Quality F = Common flags 1 = L2 Flag Byte 1 2 = L2 Flag Byte 2 3 = L2 Flag Byte 3 (only produced for ## = 13 through 25) A = Interim Daily ## = 1 through 36 for Ocean Color parameters or D1, D2, N1, and N2 for SST parameters or 41 through 61, 63 through 66, and 69 through 78 for QC parameters)</p>	3	P	*	20	MOD_PRmtbin

Table 3-3-1. MODIS Dynamic Product ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MO {04,36,1D} {M, S,N,Q,F,1,2,3}D##	<p>MODIS/Terra Ocean Color and SST {Mean} Maps Daily L3 Global {4km} CylEqDis</p> <p>{Std. Dev.} {36km}</p> <p>{Number} {1Deg}</p> <p>{Quality}</p> <p>{Common Flags}</p> <p>{Flag Byte 1}</p> <p>{Flag Byte 2}</p> <p>{Flag Byte 3}</p> <p>(Where: M = MODIS O = Oceans {04, 36, 1D} = resolution and size: 04 = 4 km 36 = 36 km 1D = 1 Degree {M, S, N, Q, F, 1, 2, 3} = values mapped: M = Mean S = Standard deviation N = Number of observations Q = Quality F = Common flags 1 = L2 Flag Byte 1 2 = L2 Flag Byte 2 3 = L2 Flag Byte 3 (only produced for ## = 13 through 25) D = Daily ## = 1 through 36 for Ocean Color parameters or D1, D2, N1, and N2 for SST parameters.)</p>	3	P	*	53	MOD_PRMcloud

Table 3-3-1 MODIS Dynamic Product ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}M##	<p>MODIS/Terra Ocean Color and SST {Mean} Maps Monthly L3 Global {4km} CylEqDis</p> <p>{Std. Dev.} {36km}</p> <p>{Number} {1Deg}</p> <p>{Quality}</p> <p>{Common Flags}</p> <p>{Flag Byte 1}</p> <p>{Flag Byte 2}</p> <p>{Flag Byte 3}</p> <p>(Where: M = MODIS O = Oceans {04, 36, 1D} = resolution and size: 04 = 4 km 36 = 36 km 1D = 1 Degree {M, S, N, Q, F, 1, 2, 3} = values mapped: M = Mean S = Standard deviation N = Number of observations Q = Quality F = Common flags 1 = L2 Flag Byte 1 2 = L2 Flag Byte 2 3 = L2 Flag Byte 3 (only produced for ## = 13 through 25) M = Monthly ## = 1 through 36 for Ocean Color parameters or D1, D2, N1, and N2 for SST parameters.)</p>	3	P	*	73	MOD_PRmtbin

Table 3-3-1. MODIS Dynamic Product ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}N##	<p>MODIS/Terra Ocean Color and SST {Mean} Maps Yearly L3 Global {4km} CylEqDis {Std. Dev.} {36km} {Number} {1Deg} {Quality} {Common Flags} {Flag Byte 1} {Flag Byte 2} {Flag Byte 3}</p> <p>(Where: M = MODIS O = Oceans {04, 36, 1D} = resolution and size: 04 = 4 km 36 = 36 km 1D = 1 Degree {M, S, N, Q, F, 1, 2, 3} = values mapped: M = Mean S = Standard deviation N = Number of observations Q = Quality F = Common flags 1 = L2 Flag Byte 1 2 = L2 Flag Byte 2 3 = L2 Flag Byte 3 (only produced for ## = 13 through 25) N = Yearly ## = 1 through 36 for Ocean Color parameters or D1, D2, N1, and N2 for SST parameters.)</p>	3	P	*	74	MOD_PRmtbin

Table 3-3-1. MODIS Dynamic Product ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}W##	<p>MODIS/Terra Ocean Color and SST {Mean} Maps 8-Day L3 Global {4km} CylEqDis</p> <p>{Std. Dev.} {36km}</p> <p>{Number} {1Deg}</p> <p>{Quality}</p> <p>{Common Flags}</p> <p>{Flag Byte 1}</p> <p>{Flag Byte 2}</p> <p>{Flag Byte 3}</p> <p>(Where: M = MODIS O = Oceans {04, 36, 1D} = resolution and size: 04 = 4 km 36 = 36 km 1D = 1 Degree {M, S, N, Q, F, 1, 2, 3} = values mapped: M = Mean S = Standard deviation N = Number of observations Q = Quality F = Common flags 1 = L2 Flag Byte 1 2 = L2 Flag Byte 2 3 = L2 Flag Byte 3 (only produced for ## = 13 through 25) W = 8-Day weekly ## = 1 through 36 for Ocean Color parameters or D1, D2, N1, and N2 for SST parameters.)</p>	3	P	*	54	MOD_PRmtbin

Table 3-3-1. MODIS Dynamic Product ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MOD000	MODIS/Terra Raw Instrument Packets 2-Hr L0 Swath	1	P	*	N/A	MOD_PR01
MOD01	MODIS/Terra Raw Radiances in Counts 5-Min L1A Swath	1	P	*	01	MOD_PR01
MOD01SS	MODIS/Terra Subsetted Raw Radiances in Counts 5-Min L1A Swath	1	P	*	71	MOD_PR01SS
MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km	1	P	*	02	MOD_PR02
MOD02CRS	MODIS/Terra Coarse Calibrated Radiances 5-Min L2 Swath 5km	2	P	*	11	MOD_PR02CRS
MOD02CSS	MODIS/Terra Subsampled Coarse Calibrated Radiances 5-min L2 Swath 5km	2	P	*	11	MOD_PR02CRS
MOD02HKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 500m	1	P	*	02	MOD_PR02
MOD02OBC	MODIS/Terra On-Board Calibrator and Engineering Data 5-Min L1B	1	P	*	02	MOD_PR02
MOD02QKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250m	1	P	*	02	MOD_PR02
MOD021QA	MODIS/Terra QA Summary of Calibrated Radiances 5-Min L1B 1km	1	Q	*	02	MOD_PR02
MOAPWA	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 4km CylEqDis	4	P	*	51	MOD_PR27W
MOAPWB	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 36km CylEqDis	4	P	*	51	MOD_PR27W
MOAPW1	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 1Deg CylEqDis	4	P	*	51	MOD_PR27W
MOAPYA	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 4km CylEqDis	4	P	*	51	MOD_PR27Y
MOAPYB	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 36km CylEqDis	4	P	*	51	MOD_PR27Y
MOAPY1	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 1Deg CylEqDis	4	P	*	51	MOD_PR27Y
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km	1	P	*	01	MOD_PR03
MOD03CP	MODIS/Terra Geolocation Control Point Residuals 5-Min L2 50m	N/A	Q	*	60	MOD_PR03CP
MOD04L_O	MODIS/Terra Orbital Aerosol Product 1-Orbit L3 Swath 18km ISIN Grid	3	P	*	05	MOD_PR04ORB
MOD04_L2	MODIS/Terra Aerosol 5-Min L2 Swath 10km	2	P	*	04	MOD_PR04_05
MOD04_QC	MODIS/Terra MOD_PR04 Diagnostic File for Uncorrected Water Vapor 5-Min L2	2	Q	*	04	MOD_PR04_05
MOD05_L2	MODIS/Terra Total Precipitable Water Vapor 5-Min L2 Swath 1km and 5km	2	P	*	04	MOD_PR04_05
MOD05_QC	MODIS/Terra MOD_PR05 Diagnostic File for Uncorrected Water Vapor 5-Min L2	2	Q	*	04	MOD_PR04_05

Table 3-3-1. MODIS Dynamic Product ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MOD06_L2	MODIS/Terra Clouds 5-Min L2 Swath 1km and 5km	2	P	*	06	MOD_PR06CT, MOD_PR06CD, MOD_PR06OD
MOD07_L2	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km	2	P	*	03	MOD_PR07
MOD07_QC	MODIS/Terra Vertical Profiles Diagnostics 5-Min L2 5km	2	Q	*	03	MOD_PR07
MOD08D3H	MODIS/Terra Aerosol/Water Vapor/Cloud Daily L3 Global 0.1Deg CMG	3	Q	*	56	MOD_PR08DH
MOD08_D3	MODIS/Terra Aerosol Cloud Water Vapor Ozone Daily L3 Global 1Deg CMG	3	P	*	56	MOD_PR08D
MOD08_E3	MODIS/Terra Aerosol Cloud Water Vapor Ozone 8-Day L3 Global 1Deg CMG	3	P	*	70	MOD_PR08E
MOD08_M3	MODIS/Terra Aerosol Cloud Water Vapor Ozone Monthly L3 Global 1Deg CMG	3	P	*	57	MOD_PR08MC, MOD_PR08M
MOD08TLH	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone 0.1Deg CMG	3	Q	*	69	MOD_PR08TH
MOD08_TL	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone 1Deg CMG	3	P	*	69	MOD_PR08T
MOD09	MODIS/Terra Surface Reflectance 5-Min L2 Swath 250m, 500m and 1km	2	P	*	11	MOD_PR09
MOD09A1	MODIS/Terra Surface Reflectance 8-Day L3 Global 500m ISIN Grid	3	P	*	21	MOD_PR09A
MOD09A1C	MODIS/Terra Coarse Surface Reflectance 8-Day L3 Global 5km ISIN Grid	3	P	*	21	MOD_PR09A
MOD09CRS	MODIS/Terra Coarse Surface Reflectance 5-Min L2 Swath 5km	2	P	*	11	MOD_PR09
MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m ISIN Grid	2G	P	*	13	MOD_PRMGR
MOD09GQK	MODIS/Terra Surface Reflectance Daily L2G Global 250m ISIN Grid	2G	P	*	13	MOD_PRMGR
MOD09GST	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km ISIN Grid	2G	P	*	13	MOD_PRMGR
MOD09Q1	MODIS/Terra Surface Reflectance 8-Day L3 Global 250m ISIN Grid	3	P	*	21	MOD_PR09A
MOD09Q1C	MODIS/Terra Coarse Surface Reflectance 8-Day L3 Global 5km ISIN Grid	3	P	*	21	MOD_PR09A

Table 3-3-1. MODIS Dynamic Product ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MOD10A1	MODIS/Terra Snow Cover Daily L3 Global 500m ISIN Grid	3	P	*	43	MOD_PR10A
MOD10A2	MODIS/Terra Snow Cover 8-Day L3 Global 500m ISIN Grid	3	P	*	45	MOD_PR10A2
MOD10C1	MODIS/Terra Snow Cover Daily L3 Global 28km CMG	3	P	*	46	MOD_PR10C1
MOD10C2	MODIS/Terra Snow Cover 8-Day L3 Global 28km CMG	3	P	*	67	MOD_PR10C2
MOD10L2C	MODIS/Terra Coarse Snow Cover 5-Min L2 Swath 5km	2	P	*	07	MOD_PR10
MOD10L2G	MODIS/Terra Snow Cover Daily L2G Global 500m ISIN Grid	2G	P	*	14	MOD_PRMGR
MOD10_L2	MODIS/Terra Snow Cover 5-Min L2 Swath 500m	2	P	*	07	MOD_PR10
MOD11A1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 1km ISIN Grid	3	P	*	16	MOD_PR11
MOD11A2	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 1km ISIN Grid	3	P	*	31	MOD_PR11A
MOD11B1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 5km ISIN Grid	3	P	*	16	MOD_PR11
MOD11C1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 56km CMG	3	P	*	32	MOD_PR11C
MOD11C2	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 56km CMG	3	P	*	58	MOD_PR11C
MOD11C3	MODIS/Terra Land Surface Temperature/Emissivity 32-Day L3 Global 56km CMG	3	P	*	59	MOD_PR11C
MOD11UPD	MODIS/Terra Land Surface Temperature Update Files L3 Global 1km ISIN Grid	3	P	Deviation from standard: "update_for_1st" appears in data date/time field	16	MOD_PR11
MOD11_L2	MODIS/Terra Land Surface Temperature/Emissivity 5-Min L2 Swath 1km	2	P	*	16	MOD_PR11
MOD12C1	MODIS/Terra Land Cover Type 96-Day L3 Global 56km CMG	3	P	*	42	MOD_PR12C
MOD12C2	MODIS/Terra Land Cover Change 96-Day L3 Global 56km CMG	3	P	*	42	MOD_PR12C
MOD12M	MODIS/Terra Land Cover Database 32-Day L3 Global 1km ISIN Grid	3	P	*	40	MOD_PR12M
MOD12Q1	MODIS/Terra Land Cover Type 96-Day L3 Global 1km ISIN Grid	3	P	*	41	MOD_PR12Q
MOD12Q1C	MODIS/Terra Coarse Land Cover Type 96-Day L3 Global 5km ISIN Grid	3	P	*	41	MOD_PR12Q
MOD12Q2	MODIS/Terra Land Cover Change 96-Day L3 Global 1km ISIN Grid	3	P	*	41	MOD_PR12Q
MOD13A1	MODIS/Terra Vegetation Indices 16-Day L3 Global 500m ISIN Grid	3	P	*	25	MOD_PR13A1
MOD13A1C	MODIS/Terra Coarse Vegetation Indices 16-Day L3 Global 5km ISIN Grid	3	P	*	25	MOD_PR13A1
MOD13A2	MODIS/Terra Vegetation Indices 16-Day L3 Global 1km ISIN Grid	3	P	*	35	MOD_PR13A2

Table 3-3-1. MODIS Dynamic Product ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MOD13A2C	MODIS/Terra Coarse Vegetation Indices 16-Day L3 Global 5km ISIN Grid	3	P	*	35	MOD_PR13A2
MOD13A3	MODIS/Terra Vegetation Indices Monthly L3 Global 1km ISIN Grid	3	P	*	26	MOD_PR13A3
MOD13C2	MODIS/Terra Vegetation Indices 16-Day L3 Global 28km CMG	3	P	*	27	MOD_PR13C2
MOD13C3	MODIS/Terra Vegetation Indices Monthly L3 Global 28km CMG	3	P	*	28	MOD_PR13C3
MOD13Q1	MODIS/Terra Vegetation Indices 16-Day L3 Global 250m ISIN Grid	3	P	*	25	MOD-PR13A1
MOD14	MODIS/Terra Thermal Anomalies/Fire 5-Min L2 Swath 1km	2	P	*	30	MOD_PR09
MOD14A1	MODIS/Terra Thermal Anomalies/Fire Daily L3 Global 1km ISIN Grid	3	P	*	29	MOD_PR14A
MOD14A2	MODIS/Terra Thermal Anomalies/Fire 8-Day L3 Global 1km ISIN Grid	3	P	*	31	MOD_PR14A
MOD14C3	MODIS/Terra Thermal Anomalies/Fire 32-Day L3 Global 28km CMG	3	P	*	62	MOD_PR14C
MOD14CRS	MODIS/Terra Coarse Thermal Anomalies/Fire	2	P	*	30	MOD_PR14
MOD14GD	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km ISIN Grid Day	2G	P	*	13	MOD_PRMGR
MOD14GN	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km ISIN Grid Night	2G	P	*	13	MOD_PRMGR
MOD15A1	MODIS/Terra Leaf Area Index/FPAR Daily L4 Global 1km ISIN Grid	4	P	*	33	MOD_PR15A1
MOD15A1C	MODIS/Terra Coarse Leaf Area Index/FPAR Daily L4 Global 5km ISIN Grid	4	P	*	33	MOD_PR15A1
MOD15A2	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 1km ISIN Grid	4	P	*	34	MOD_PR15A2
MOD15A2C	MODIS/Terra Coarse Leaf Area Index/FPAR 8-Day L4 Global 5km ISIN Grid	4	P	*	34	MOD_PR15A2
MOD15C2	MODIS/Terra Leaf Area Index/FPAR Monthly L4 Global 56km CMG	4	P	*	63	MOD_PR15C2
MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km ISIN Grid	4	P	*	36	MOD_PR17A1
MOD17APS	MODIS/Terra Net Photosynthesis/Respiration Database Daily L4 Global 1km ISIN Grid	4	P	*	36	MOD_PR17A1
MOD17A2	MODIS/Terra Net Photosynthesis 8-Day L4 Global 1km ISIN Grid	4	P	*	37	MOD_PR17A2
MOD17A2C	MODIS/Terra Coarse Net Photosynthesis 8-Day L4 Global 5km ISIN Grid	4	P	*	37	MOD_PR17A2
MOD17A3	MODIS/Terra Net Primary Production Yearly L4 Global 1km ISIN Grid	4	P	*	38	MOD_PR17A3
MOD17A3C	MODIS/Terra Coarse Net Primary Production Yearly L4 Global 5km ISIN Grid	4	P	*	38	MOD_PR17A3
MOD17C2	MODIS/Terra Net Photosynthesis 8-Day L4 Global 56km CMG	4	P	*	39	MOD_PR17C2

Table 3-3-1. MODIS Dynamic Product ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MOD17C3	MODIS/Terra Net Primary Production Yearly L4 Global 56km CMG	4	P	*	64	MOD_PR17C3
MOD27HV	MODIS/Terra Ocean Annual Empirical Productivity 8-Day L4 Global 4km ISEAG	4	P	*	52	MOD_PR27HV
MOD27W	MODIS/Terra Ocean Weekly Productivity Indices 8-Day L4 Global 4km ISEAG	4	P	*	51	MOD_PR27W
MOD27Y	MODIS/Terra Ocean Annual Productivity Indices Yearly L4 Global 4km ISEAG	4	P	*	51	MOD_PR27Y
MOD28Amm	MODIS/Terra Sea Surface Temperature Time-Binned Interim Params 1-4 Daily L3 Global 4km ISEAG (where mm = one of parameters D1, D2, N1, N2)	3	P	*	20	MOD_PRmtbin
MOD28Bmm	MODIS/Terra Sea Surface Temperature Space-Binned Composite Params 1-4 5-Min L3 Global 1km ISEAG (where mm = one of parameters D1, D2, N1, N2)	3	P	*	10	MOD_PRmsbin
MOD28Dmm	MODIS/Terra Sea Surface Temperature QC'd Composite Params 1-4 Daily L3 Global 4km ISEAG (where mm = one of parameters D1, D2, N1, N2)	3	P	*	53	MOD_PRmcloud
MOD28Emm	MODIS/Terra Sea Surface Temperature Interim Composite Params 1-4 8-Day L3 Global 4km ISEAG (where mm = one of parameters D1, D2, N1, N2)	3	P	*	49	MOD_PRmtbin
MOD28Fmm	MODIS/Terra Sea Surface Temperature Temporary Composite Params 1-4 <varies> L3 Global 4km ISEAG (where mm = one of parameters D1, D2, N1, N2)	3	T	*	O	MOD_PRmtbin MOD_PRmspc
MOD28L2	MODIS/Terra Sea Surface Temperature Products 5-Min L2 Swath 1km	2	P	*	10	MOD_PR28
MOD28Mmm	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 Monthly L3 Global 4km ISEAG (where mm = one of parameters D1, D2, N1, N2)	3	P	*	73	MOD_PRmtbin
MOD28Nmm	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 Yearly L3 Global 4km ISEAG (where mm = one of parameters D1, D2, N1, N2)	3	P	*	74	MOD_Prmtbin
MOD28QC	MODIS/Terra Ocean Color QC Products 5-Min L2 Swath 1km Day	2	Q	*	10	MOD_PR28
MOD28Rmm	MODIS/Terra Sea Surface Temperature Interim Composite Params 1-4 24-Day L3 Global 4km ISEAG (where mm = one of parameters D1, D2, N1, N2)	3	P	*	50	MOD_Prmtbin MOD_Prmfill
MOD28Wmm	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 8-Day L3 Global 4km ISEAG (where mm = one of parameters D1, D2, N1, N2)	3	P	*	54	MOD_Prmtbin

Table 3-3-1. MODIS Dynamic Product ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MOD29	MODIS/Terra Sea Ice Extent 5-Min L2 Swath 1km	2	P	*	08	MOD_PR29
MOD29C1D	MODIS/Terra Sea Ice Extent Daily L3 Global 28km CMG Day	3	P	*	48	MOD_PR29C1
MOD29C1N	MODIS/Terra Sea Ice Extent Daily L3 Global 28km CMG Night	3	P	*	48	MOD_PR29C1
MOD29C2D	MODIS/Terra Sea Ice Extent 8-Day L3 Global 28km CMG Day	3	P	*	68	MOD_PR29C2
MOD29C2N	MODIS/Terra Sea Ice Extent 8-Day L3 Global 28km CMG Night	3	P	*	68	MOD_PR29C2
MOD29GD	MODIS/Terra Sea Ice Extent Daily L2G Global 1km ISIN Grid Day (alternate products, not currently being produced)	2G	P	*	15	MOD_PRMGR
MOD29GN	MODIS/Terra Sea Ice Extent Daily L2G Global 1km ISIN Grid Night (alternate products, not currently being produced)	2G	P	*	15	MOD_PRMGR
MOD29L2C	MODIS/Terra Coarse Sea Ice Extent 5-Min L2 Swath 5km	2	P	*	08	MOD_PR29
MOD29PGD	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Day	2G	P	*	15	MOD_PRMGR
MOD29PGN	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Night	2G	P	*	15	MOD_PRMGR
MOD29P1D	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Day	3	P	*	44	MOD_PR29A1
MOD29P1N	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Night	3	P	*	44	MOD_PR29A1
MOD29P2D	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1km EASE-Grid Day	3	P	*	47	MOD_PR29A2
MOD29P2N	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1km EASE-Grid Night	3	P	*	47	MOD_PR29A2
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km	2	P	*	03	MOD_PR35
MOD35_QC	MODIS/Terra Cloud Mask and Spectral Test Diagnostics 5-Min L2 250m and 1km	2	Q	*	03	MOD_PR35
MOD43B1	MODIS/Terra BRDF/Albedo Model-1 16-Day L3 Global 1km ISIN Grid	3	P	*	23	MOD_PR43B
MOD43B1C	MODIS/Terra Coarse BRDF/Albedo Model-1 16-Day L3 Global 5km ISIN Grid	3	P	*	23	MOD_PR43B
MOD43B2	MODIS/Terra BRDF/Albedo Model-2 16-Day L3 Global 1km ISIN Grid	3	P	*	23	MOD_PR43B
MOD43B3	MODIS/Terra Albedo 16-Day L3 Global 1km ISIN Grid	3	P	*	23	MOD_PR43B
MOD43B3C	MODIS/Terra Coarse Albedo 16-Day L3 Global 5km ISIN Grid	3	P	*	23	MOD_PR43B
MOD43B4	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 1km ISIN Grid	3	P	*	23	MOD_PR43B
MOD43B4C	MODIS/Terra Coarse Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 5km ISIN Grid	3	P	*	23	MOD_PR43B

Table 3-3-1. MODIS Dynamic Product ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MOD43C1	MODIS/Terra BRDF/Albedo 16-Day L3 Global 28km CMG	3	P	*	24	MOD_PR43C
MOD43C2	MODIS/Terra BRDF/Albedo 32-Day L3 Global 28km CMG	3	P	*	65	MOD_PR43C
MOD44A	MODIS/Terra Vegetation Cover Conversion 32-Day L4 Global 250m ISIN Grid	4	P	*	66	MOD_PR44A
MOD44B	MODIS/Terra Vegetation Continuous Fields Yearly L4 Global 1km ISIN Grid	4	P	*	61	MOD_PR44B
MOD44CH	MODIS/Terra Vegetation Intermediate Composite 16-Day L4 Global 500m ISIN Grid	4	P	*	72	MOD_PR44C
MOD44CQ	MOSIS/Terra Vegetation Intermediate Composite 16-Day L4 Global 250m ISIN Grid	4	P	*	72	MOD_PR44C
MOD44CT	MODIS/Terra Vegetation Intermediate Composite Metadata 16-Day L4 Global	4	P	*	72	MOD_PR44C
MOD5C_QC	MODIS/Terra MOD_PR05 Final Diagnostic File for Corrected Water Vapor 5-Min L2	2	Q	*	04	MOD_PR04_05
MOD6ANCT	MODIS/Terra Cloud Product Temporary File in HDF Format 5-Min L2	2	T	*	06	MOD_PR06
MOD6CTQC	MODIS/Terra MOD_PR06CT QC File for Cloud Top Algorithm 5-Min L2	2	Q	*	06	MOD_PR06CT
MOD6CDQC	MODIS/Terra MOD_PR06CD QC File for Cirrus Detection Algorithm 5-Min L2	2	Q	*	06	MOD_PR06CD
MOD6ODQC	MODIS/Terra MOD_PR06OD QC File for Cloud Optical Depth Algorithm 5-Min L2	2	Q	*	06	MOD_PR06OD
MODAGAGG	MODIS/Terra BRDF Preprocessing Database Daily L3 Global 1km ISIN Grid	3	P	*	22	MOD_PRAGG
MODAGTEX	MODIS/Terra BRDF Texture Database Daily L3 Global 1km ISIN Grid	3	P	*	22	MOD_PRAGG
MODCSR_8	MODIS/Terra Clear Sky Radiances Running Statistics 8-Day L3 Global 25km CMG	3	P	*	55	MOD_PRCR
MODCSR_D	MODIS/Terra Clear Sky Radiances Statistics Daily L3 Global 25km CMG	3	P	*	55	MOD_PRCR
MODCSR_G	MODIS/Terra Clear Sky Radiance Statistics 5-Min L2 25km	2	P	*	03	MOD_PR35
MODMGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km ISIN Grid Day	2G	P	*	12	MOD_PRMGR
MODMGAN	MODIS/Terra Geolocation Angles Daily L2G Global 1km ISIN Grid Night	2G	P	*	12	MOD_PRMGR
MODMGPGD	MODIS/Terra Geolocation Angles Daily L2G Global 1km EASE-Grid Day	2G	P	*	12	MOD_PRMGR
MODMGPGN	MODIS/Terra Geolocaion Angles Daily L2G Global 1km EASE-Grid Night	2G	P	*	12	MOD_PRMGR
MODOCAnn	MODIS/Terra Ocean Color Time-Binned Interim Params 1-36 Daily L3 Global 4km ISEAG (where nn = one of parameters 1-36)	3	P	*	20	MOD_PRmtbin

Table 3-3-1. MODIS Dynamic Product ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MODOCBnn	MODIS/Terra Ocean Color Space-Binned Composite Params 1-36 5-Min L3 Global 1km ISEAG (where nn = one of parameters 1-36)	3	P	*	09	MOD_PRmsbin
MODOCDnn	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Daily L3 Global 4km ISEAG (where nn = one of parameters 1-36)	3	P	*	53	MOD_PRmcloud
MODOCEnn	MODIS/Terra Ocean Color Interim Composite Params 1-36 8-Day L3 Global 4km ISEAG (where nn = one of parameters 1-36)	3	P	*	49	MOD_PRmtbin
MODOCFnn	MODIS/Terra Ocean Color Temporary Composite Params 1-36 <varies> L3 Global 4km ISEAG (where nn = one of parameters 1-36)	3	T	*	O	MOD_PRmfill MOD_PRmtbin MOD_PRmspc
MODOCL2	MODIS/Terra Ocean Color Radiance Products 5-Min L2 Swath 1km Day	2	P	*	09	MOD_PR18
MODOCL2A	MODIS/Terra Ocean Color Derived Products Group 1 5-Min L2 Swath 1km Day	2	P	*	09	MOD_PR18
MODOCL2B	MODIS/Terra Ocean Color Derived Products Group 2 5-Min L2 Swath 1km Day	2	P	*	09	MOD_PR18
MODOCMnn	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Monthly L3 Global 4km ISEAG (where nn = one of parameters 1-36)	3	P	*	73	MOD_PRmtbin
MODOCNnn	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Yearly L3 Global 4km ISEAG (where nn = one of parameters 1-36)	3	P	*	74	MOD_PRmtbin
MODOCNMC	NMC ancillary data for MODIS Oceans processing	N/A	P	*	17	MOD_PRNMC
MODOCOZN	TOMS ozone data for MODIS Oceans processing	N/A	P	*	19	MOD_PROZN
MODOCQC	MODIS/Terra Ocean Color QC Products 5-Min L2 Swath 1km Day	2	Q	*	09	MOD_PR18
MODOCRnn	MODIS/Terra Ocean Color Interim Composite Params 1-36 24-Day L3 Global 4km ISEAG (where nn = one of parameters 1-36)	3	P	*	50	MOD_PRmfill
MODOCREY	Reynolds Sea Surface Temperature data for MODIS Oceans processing	N/A	P	*	18	MOD_PRREY
MODOCWnn	MODIS/Terra Ocean Color QC'd Composite Params 1-36 8-Day L3 Global 4km ISEAG (where nn = one of parameters 1-36)	3	P	*	54	MOD_PRmtbin

Table 3-3-1. MODIS Dynamic Product ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	PGE	Process
MODOCY27	MODIS/Terra Ocean Chlorophyll Running Year Average 8-Day L3 Global 4km ISEAG	3	P	*	52	MOD_PRmtbin
MODOQAqq	MODIS/Terra Interim Composite Ocean Color QC Products Daily L3 Global 4km ISEAG (where qq = one of parameters 51-61, 63-66)	3	P	*	20	MOD_PRmtbin
MODOQBqq	MODIS/Terra Ocean Color Space-Binned Composite QC Products 5-Min L3 Global 1km ISEAG (where qq = one of parameters 51-61, 63-66)	3	P	*	09	MOD_PRmtbin
MODPT1KD	MODIS/Terra Observation Pointers Daily L2G Global 1km ISIN Grid Day	2G	P	*	12	MOD_PRMGPNTR
MODPT1KN	MODIS/Terra Observation Pointers Daily L2G Global 1km ISIN Grid Night	2G	P	*	12	MOD_PRMGPNTR
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m ISIN Grid	2G	P	*	12	MOD_PRMGPNTR
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m ISIN Grid	2G	P	*	12	MOD_PRMGPNTR
MODPTPGD	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Day	2G	P	*	12	MOD_PRMGPNTR
MODPTPGN	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Night	2G	P	*	12	MOD_PRMGPNTR
MODPTPHD	MODIS/Terra Observation Pointers Daily L2G Global 500m EASE-Grid Day	2G	P	*	12	MOD_PRMGPNTR
MODPTPHN	MODIS/Terra Observation Pointers Daily L2G Global 500m EASE-Grid Night	2G	P	*	12	MOD_PRMGPNTR
MODPTPQD	MODIS/Terra Observation Pointers Daily L2G Global 250m EASE-Grid Day	2G	P	*	12	MOD_PRMGPNTR
MODPTPQN	MODIS/Terra Observation Pointers Daily L2G Global 250m EASE-Grid Night	2G	P	*	12	MOD_PRMGPNTR
MODSQArr	MODIS/Terra Interim Sea Surface Temperature QC Product Daily L3 Global 4km ISEAG (where rr = one of parameters D1-D9, DA, N1-N9, NA)	3	P	*	20	MOD_PRmtbin
MODSQBrr	MODIS/Terra Sea Surface Temperature Space-Binned Composite QC Products, 5-Min L3 Global 1km ISEAG (where rr = one of parameters D1-D-9, DA, N1-N9, NA)	3	P	*	10	MOD_PRmsbin
MOD_SS	MODIS/Terra Land Subsetting QA Files (These will have unique names for each PGE.)	N/A	P	*	L	MOD_PRSS
MODVOLC	MODIS/Terra Volcano Alert 5-Min L2	2	Q	*	03	MOD_PRVOLC
MOSPY1	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 1Deg CylEqDis	4	P	*	52	MOD_PR27HV
MOSPYA	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 4km CylEqDis	4	P	*	52	MOD_PR27HV
MOSPYB	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 36km CylEqDis	4	P	*	52	MOD_PR27HV

Table 3-3-2. MODIS Static File Container ESDTs

Note: V# = Version number of file, appended at end; * or # = Version number of file, incorporated in middle

ESDT	LongName/Product Description	Lev	Type	File Name	Process
MOD01LUT	MODIS/Terra Engineering List of Data Structures for Production of MOD01	1	S	ENGINEERING_DATA_LIST	MOD_PR01
MOD02LUT	MODIS/Terra Instrument Calibration Parameters LUT for Production of MOD02	1	S	Reflective_Lookup_Tables_file_V#	MOD_PR02
			S	Emissive_Lookup_Tables_file_V#	
			S	QA_Lookup_Tables_file_V#	
MOD03LUT	MODIS/Terra Input Instrument and Satellite Parameters for Production of MOD03	1	S	MOD03LUT.coeff	MOD_PR03
MOD04LUT	MODIS/Terra Radiative Transfer LUTs for Production of MOD04_L2	2	S	phsomega.input.V#	MOD_PR04_05
			S	lookup.wav466.V#	
			S	lookup.wav655.V#	
			S	mod04ocean.in.V#	
			S	big_v1c1.dat.V#	
			S	big_v2c1.dat.V#	
			S	big_v3c1.dat.V#	
			S	small_v1c1.dat.V#	
			S	small_v2c1.dat.V#	
			S	small_v3c1.dat.V#	
			S	TRANSM_H2O_1P38_MICRON.V#	
MOD05LUR	MODIS/Terra Radiative Transfer LUTs for Production of MOD05_L2	2	S	TRANSM_H2O.MDL_1_H2k.V#	MOD_PR04_05
			S	TRANSM_H2O.MDL_2_H2kV#	
			S	TRANSM_H2O.MDL_3_H2k.V#	
			S	TRANSM_H2O.MDL_4_H2k.V#	
			S	TRANSM_H2O.MDL_5_H2k.V#	
			S	TRANSM_H2O.MDL_6_H2k.V#	
MOD05LUW	MODIS Weight Factors LUT for Production of MOD05_L2	2	S	WEIGHT_TABLE.V#	MOD_PR04_05
			S	Ascii 0.86 Micron Reflectance Table	
			S	Ascii 0.94/0.86 Reflectance Ratio Table	

Table 3-3-2. MODIS Static File Container ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	Process
MOD06LUT	MODIS/Terra Cloud Product LUTs for MOD_PR06CT, MOD_PR06CD, and MOD_PR06OD	2	S	flux_ts040_water.dat.V#	
			S	flux_ts080_water.dat.V#	
			S	flux_ts150_water.dat.V#	
			S	flux_tsinf_water.dat.V#	
			S	refl_ts040_water.B.V#	
			S	refl_ts080_water.B.V#	
			S	refl_ts150_water.B.V#	
			S	refl_tsinf_water.B.V#	
			S	flux_ts040_ice.dat.V#	
			S	flux_ts080_ice.dat.V#	
			S	flux_ts150_ice.dat.V#	
			S	flux_tsinf_ice.dat.V#	
			S	refl_ts040_ice.B.V#	
			S	refl_ts080_ice.B.V#	
			S	refl_ts150_ice.B.V#	
			S	refl_tsinf_ice.B.V#	
			S	modisdry.pfm.V#	
			S	modisozo.pfm.V#	
			S	modiswts.pfm.V#	
			S	modiswtl.pfm.V#	
			S	modiswco.pfm.V#	
			S	atmo_trans_1way.dat (future)	
			S	atmo_trans_2way.dat (future)	
			S	atmo_emission.dat (future)	
			S	library_desc.dat.V#	
			S	tau.hdf.V#	
			S	IGBP_map.hdf.V#	
MOD07LUT	MODIS/Terra Regression Coefficients and MODIS Sensor Zenith Angle Parameter Files	2	S	MODIS_REGCOEF_FAC3.0_2001_03_27.bin	MOD_PR07
			S	MODIS_Senzen.bin	

Table 3-3-2. MODIS Static File Container ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	Process
MOD09LU1	MODIS/TerraAerosol Transmittance LUTs for Production of MOD09	2	S	SraTable.V#	MOD_PR09
			S	AeroTrans.0469.V#	
			S	AeroTrans.0547.V#	
			S	AeroTrans.0664.V#	
			S	AeroTrans.0875.V#	
			S	AeroTrans.1240.V#	
			S	AeroTrans.1640.V#	
			S	AeroTrans.2142.V#	
MOD09LU2	MODIS/Terra Concentration LUTs for Production of MOD09	2	S	Con_0469.V#	MOD_PR09
			S	Con_0547.V#	
			S	Con_0664.V#	
			S	Con_0875.V#	
			S	Con_1240.V#	
			S	Con_1640.V#	
			S	Con_2142.V#	
MOD09LU3	MODIS/Terra Various LUTs for Production of MOD09	2	S	toms_10yr.anc	MOD_PR09
			S	ANC_OORT_WV.CLIMATOLOGY.V#	
			S	landcov_8km.V#	
			S	surface_pres.mbars..V#	
			S	spres_2x2.5.mbars.V#	
			S	VALID_COORDS	

Table 3-3-2. MODIS Static File Container ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	Process
MOD11LCV	MODIS/Terra Land Cover Input Files for MOD_PR11	2	S	MOD.AM1.V2.landcover_1km.L3. yyyyddd.hmm.vnn.yyyddd (where hmm and vnn refer to the horizontal and vertical tile numbers in the integerized sinusoidal grid; yyyy and ddd are start and stop year and Julian day for valid data)	MOD_PR11
MOD11LUW	MODIS/Terra Land Surface Temperature Split Window LUT for Production of MOD11	2	S S S	sol_term_tbls tir_term_tbls f_bin2_1	MOD_PR11
MOD12LUT	MODIS/Terra LUTs for Production of MOD12	3	S S S	q_weights31 q_features q_anc_dem	MOD_PR12Q
MOD15LUT	MODIS/Terra LUTs for Production of MOD_PR15A1 products	3	S	MOD15AL_ANC_RI4.hdf	MOD_PR15A1
MOD17LUT	MODIS/TerraLUTs for Production of MOD_PR17 products	3	S	MOD17_ANC_RI4.hdf	MOD_PR17Y
MOD27LUT	MODIS/Terra LUTs for Production of MOD27W	4	S S	mld.bin.coeff par.bin.coeff	MOD_PR27W
MOD28LUT	MODIS/Terra SST Generic Input Files	2,3	S S S S	emissivity.dat.coeff spectra.coeff modsst_sst4_3.coeff modsst_sst_2.coeff	MOD_PR28
MOD28PAR	MODIS/Terra SST Parameters	2,3	S	modsst_params1.dat.coeff	MOD_PR28
MOD35ANC	MODIS/Terra Olson World Ecosystem Maps at 10 Minute and 1km Resolution and Cloud Mask Thresholds Parameter File	2	S S S	thresholds.dat.V# ecosystem.img.V# goge1_2_img.V#	MOD_PR35 MOD_PR12M MOD_PR06CT
MOD43LUA	MODIS/Terra BRDF Surface Albedo LUT for Production of MOD43	3	S	amb_albedos.dat	MOD_PR43B2
MOD43LUP	MODIS/Terra BRDF Set-up Table Database for Production of MOD43	3	S	amb_brdfdb.hdf	MOD_PR43B2
MOD43LUT	MODIS/Terra BRDF Code and Model Set-up Table for MOD43 Products	3	S	amb_setup.dat amb_brdfdbsetup.dat	MOD_PR43B2

Table 3-3-2. MODIS Static File Container ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	Process
MOD44LUT	MODIS/Terra LUTs for Production of MOD44 Products	3	S	DelB1B2_ ChangeType	MOD_PR44A
			S	MOD_PR44A_LUT_location	
			S	CoverType_LUT	
			S	ModB1B2_ ChangeType	
			S	Month_1CoverType	
MOD5CLUR	MODIS/Terra Atmospheric Correction Reflectance and Channel Ratio LUT for production of MOD05_L2	2	S	Refl_Ch2_Ascii.V#	MOD_PR04_05
			S	Ratio_Ch19_To_Ch2_Ascii.V#	
MODCPLUT	MODIS/Terra Parameters and Control Point Library files for production of MOD03CP	2	S	CP_parameters.dat	MOD_PR03CP
			S	islands.lac	
			S	chip_list (Land Control files)	
MODOCAER	MODIS/Terra Ocean Color Aerosol Coefficients	2	S	ocean_h99_v00_s00_d35_3.hdf	MOD_PR18
			S	ocean_h90_v00_s00_d35_3.hdf	
			S	ocean_h70_v00_s00_d35_3.hdf	
			S	ocean_h50_v00_s00_d35_3.hdf	
			S	marit_h99_v00_s00_d35_3.hdf	
			S	marit_h90_v00_s00_d35_3.hdf	
			S	coast_h99_v00_s00_d35_3.hdf	
			S	coast_h90_v00_s00_d35_3.hdf	
			S	marit_h70_v00_s00_d35_3.hdf	
			S	marit_h50_v00_s00_d35_3.hdf	
			S	coast_h70_v00_s00_d35_3.hdf	
			S	coast_h50_v00_s00_d35_3.hdf	
			S	tropo_h99_v00_s00_d35_3.hdf	
			S	tropo_h90_v00_s00_d35_3.hdf	
			S	tropo_h70_v00_s00_d35_3.hdf	
			S	tropo_h50_v00_s00_d35_3.hdf	

Table 3-3-2. MODIS Static File Container ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	Process
MODOCBIN	MODIS/Terra Ocean Space Binning Parameters	2	S	msbin_params1.dat.coeff	MOD_PRmsbin
MODOCLUT	MODIS/Terra Ocean Color Generic Input Files	2	S	coccolith_tables.dat.coeff	MOD_PR18
			S	modisdob.cal.coeff	
			S	modiswhite.cal.coeff	
			S	modisf0.cal.coeff	
			S	modcol_params2*.dat.coeff	
			S	clark_params2*.dat.coeff	
			S	hoge_params2*.dat.coeff	
			S	carder_params5*.dat.coeff	
			S	ipar_prms.dat.coeff	
MODOCMAP	MODIS/Terra Oceans Mapper Parameters	3	S	mmap_params*_{4km, 36km, 1d}_{m#, q, F, s#, n, 1, 2, 3}.dat.coeff	MOD_PRmmap
MODOCMSK	MODIS/Terra Oceans Processing Land and Shallow Water Masks	3	S	global_land_7.p04bit-180.hdf	MOD_PRmfill
				global_icemask.b04bit_180.hdf	
MODOCSPC	MODIS/Terra Ocean Space Converter Parameters	3	S	mmspc_params_36km_b.dat.coeff	MOD_PRmmspc
				mmspc_params_1d_b.dat.coeff	
MODOCTB	MODIS/Terra Ocean Time Binner Parameters	3	S	mtbin_params*.dat	MOD_PRmtbin

Table 3-3-2. MODIS Static File Container ESDTs (Con't)

ESDT	LongName/Product Description	Lev	Type	File Name	Process
MODOCRAY	MODIS/Terra Ocean Color Rayleigh Coefficients	3	S	rayleigh_modis_412_iqu*.dat.coeff	MOD_PR18
			S	rayleigh_modis_443_iqu*.dat.coeff	
			S	rayleigh_modis_488_iqu*.dat.coeff	
			S	rayleigh_modis_531_iqu*.dat.coeff	
			S	rayleigh_modis_551_iqu*.dat.coeff	
			S	rayleigh_modis_667_iqu*.dat.coeff	
			S	rayleigh_modis_678_iqu*.dat.coeff	
			S	rayleigh_modis_748_iqu*.dat.coeff	
			S	rayleigh_modis_869_iqu*.dat.coeff	
MODSEACL	MODIS/Terra Ocean Color Seawifs Calibration Coefficients	3	S	seawifsaer.cal.coeff (currently not used)	MOD_PR18
			S	seawifslcw.cal.coeff (currently not used)	

Table 3-4. MODIS Time-Varying Ancillary Data ESDTs

Notes:

(1) The AM/1 GEOS DAS data sets will be numbered AM1## where ## begins at 00 for the test data produced prior to launch. Data produced after launch will be numbered with AM101 experiment identification. Improvements or corrections after launch will increase the ## sequentially.

(2) Converts ancillary data from native format to HDF-EOS format for MOD_PR18 in Ocean PGE09.

ESDT	Data Set Description	File Name	Metadata Type	Time Range of Data in File	Data Type Description	PGE	Process
DFLAPMIS	DAO High Time Resolution Global Analysis, GEOS-3 Gridded Output for AM-1	DAS.flk.asm.tsyn3d_mis_p .AM100.yyyymmddhh. yyyymmddhh.v##, where ## is 01 for the first generation and is incremented for reprocessing (1)	Range DateTime	4 synoptic times at Z hours appended per day in daily file; Start ddhh, where hh=00Z and end ddhh, where hh=18Z;	First Look; 3-D Gridded (L3) instantaneous fields at synoptic times (no time averaging) mixture of prognostic and diagnostic fields, pressure level data; HDF_EOS format; 1 X 1 degree global latitude - longitude horizontal grid. Variables used: TMPU, SPHU	06	MOD_PR06OD (Future)
DFLAXCHM	DAO High Time Resolution Global Analysis, GEOS-3 Gridded Output for AM-1	DAS.flk.asm.tavg2d_chm_ x.AM100.yyyymmddhh. yyyymmddhh.v##, where ## is 01 for the first generation and is incremented for reprocessing (1)	Range DateTime	8 averaged times appended per day in daily file; Start ddhh, where hh=00Z and end ddhh, where hh=21Z; example: 6Z output is 3Z to 6Z	First Look; 2-D Gridded (L3) 3 hour upstream time averaged fields, chemical related fields, single level data; HDF_EOS format; 2 X 2.5 degree global latitude - longitude horizontal grid Variables used: OZONE	11	MOD_PR09 (Future)

Table 3-4. MODIS Time-Varying Ancillary Data ESDTs (Con't)

ESDT	Data Set Description	File Name	Metadata Type	Time Range of Data in File	Data Type Description	PGE	Process
DFLAXCLD	DAO High Time Resolution Global Analysis, GEOS-3 Gridded Output for AM-1	DAS.flk.asm.tavg2d_cld_x. AM100.yyyymmddhh. yyyymmddhh.v##, where ## is 01 for the first generation and is incremented for reprocessing (1)	Range DateTime	8 averaged times appended per day in daily file; Start ddhh, where hh=00Z and end ddhh, where hh=21Z; example: 6Z output is 3Z to 6Z	First Look; 2-D Gridded (L3) 3 hour upstream time averaged fields, cloud related fields, single level data; HDF_EOS format; 1X 1 degree global latitude - longitude horizontal grid. Variables used: CLDTMP, CLDPRS	06	MOD_PR06OD (Future)
DFLAXENG	DAO High Time Resolution Global Analysis, GEOS-3 Gridded Output for AM-1	DAS.flk.asm.tavg2d_eng_x.AM100.yyyymmddhh. yyyymmddhh.v##, where ## is 01 for the first generation and is incremented for reprocessing (1)	Range DateTime	8 averaged times appended per day in daily file; Start ddhh, where hh=00Z and end ddhh, where hh=21Z; example: 6Z output is 3Z to 6Z	First Look; 2-D Gridded (L3) 3 hour upstream time averaged fields, energy related fields, single level data; HDF_EOS format; 1 X 1 degree global latitude - longitude horizontal grid Variables used: PREACC, Q2M, Q10M, RADSWG, T2M, T10M, TPW, TGROUND	11	MOD_PR09 (Future)
						06	MOD_PR06OD (Future)
DFLAXLSM	DAO High Time Resolution Global Analysis, GEOS-3 Gridded Output for AM-1	DAS.flk.asm.tavg2d_lsm_x.AM100.yyyymmddhh.yy ymmddhh.v##, where ## is 01 for the first generation and is incremented for reprocessing (1)	Range Date Time	8 averaged times appended per day in daily file; Start ddhh, where hh = 00Z and end ddhh, where hh = 21Z	First Look; 2D Gridded (L3) 3 hour upstream time averaged fields, land surface model related fields, single level data HDF-EOS format; 1 X 1 degree global latitude - longitude horizontal grid.		Subscription for Oceans analysis

Table 3-4. MODIS Time-Varying Ancillary Data ESDTs (Con't)

ESDT	Data Set Description	File Name	Metadata Type	Time Range of Data in File	Data Type Description	PGE	Process
DFLAXMIS	DAO High Time Resolution Global Analysis, GEOS-3 Gridded Output for AM-1	DAS.flk.asm.tsyn2d_mis_x .AM100.yyyymmddhh. yyyymmddhh.v##, where ## is 01 for the first generation and is incremented for reprocessing (1)	Range DateTime	8 synoptic times appended per day in daily file; Start ddhh, where hh=00Z and end ddhh, where hh=21Z	First Look, 2-D Gridded (L3) instantaneous fields at synoptic times, mixture of prognostic and diagnostic fields, single level data; HDF_EOS format; 1 X 1 degree global latitude - longitude horizontal grid Variables used: PS	11	MOD_PR09 (Future)
DFLAXMNT	DAO High Time Resolution Global Analysis, GE05-3 Gridded Output for AM-1	DAS.flk.asm.v_Montana.A M100.yyyymmddhh.yyyy mmddhh.v##, where ## is 01 for the first generation and is incremented for reprocessing (1)	Range Date Time	8 averaged times appended per day in daily file; Start ddhh, where hh = 00Z and end ddhh, where hh = 21Z	First Look; 2D Gridded (L3) 3 hour upstream time average fields, energy related fields, single level cloud and instantaneous fields at synoptic times, mixture of prognostic and diagnostic fields, single level data and pressure level data; HDF_EOS format; 1 X 1 degree global latitude - longitude horizontal grid Variables used: Q10M, RADSWG, T10M, T10M1, PS	36	MOD_PR17A1 (Replaced by Late Look Product in Consistent Year Reprocessing)

Table 3-4. MODIS Time-Varying Ancillary Data ESDTs (Con't)

ESDT	Data Set Description	File Name	Metadata Type	Time Range of Data in File	Data Type Description	PGE	Process
DFLAXSTR	DAO High Time Resolution Global Analysis, GEOS-3 Gridded Output for AM-1	DAS.flk.asm.tavg2d_str_x. AM100.yyyymmddhh. yyyymmddhh.v##, where ## is 01 for the first generation and is incremented for reprocessing (1)	Range DateTime	8 averaged times appended per day in daily file; Start ddhh, where hh=00Z and end ddhh, where hh=21Z; example: 6Z output is 3Z to 6Z	First Look; 2-D Gridded (L3) 3 hour upstream time averaged fields, stress related fields, single level data; HDF_EOS format; 1 X 1 degree global latitude - longitude horizontal grid Variables used: PS		Subscription for Possible Use in Future
DLLAXLSM	DAO High Time Resolution Global Analysis, GEOS-3 Gridded Output for AM-1	DAS.llk.asm.tavg2d_lsm_x. AM100.yyyymmddhh.yy ymmddhh.v##, where ## is 01 for the first generation and is incremented for reprocessing (1)	Range Date Time	8 averaged times appended per day in daily file; Start ddhh, where hh = 00Z and end ddhh, where hh = 21Z	Late Look; 2D Gridded (L3) 3 hour upstream time averaged fields, land surface model related fields, single level data HDF-EOS format; 1 X 1 degree global latitude - longitude horizontal grid.		Subscription for Oceans
DLLAXMNT	DAO High Time Resolution Global Analysis, GEOS-3 Gridded Output for AM-1	DAS.llk.asm.V_Montana.A M100.yyyymmddhh.yyyy mmddhh.V##, where ## is 01 for the first generation and is incremented for reprocessing (1)	Range Date Time	8 averaged times appended per day in daily files; Start ddhh, where hh = 00Z and end ddhh, where hh = 21Z	Late Look; 2D Gridded (L3) 3 hour upstream time averaged fields, energy related fields, single level data and instantaneous fields at synoptic times, mixture of prognostic and diagnostic fields, single level data and pressure level data; HDF_EOS format; 1 X 1 degree global latitude - longitude horizontal grid Variables used: Q10M, RADSWG, T10M, T10M1, PS	51	MOD_PR27W
						36	MOD_PR17A1

Table 3-4. MODIS Time-Varying Ancillary Data ESDTs (Con't)

ESDT	Data Set Description	File Name	Metadata Type	Time Range of Data in File	Data Type Description	PGE	Process
FNMOCLML	1 Degree FNMOCL Ocean Mixed-Layer Model Output	NPR.TOPS.SP.Dyyddd. JHR00_Zhhmm	Single Date Time	Daily file on Julian day ddd at 00Z hour; file covers 00Z hour -12 hours to 00Z hour +12 hours	8X Daily 2-D Gridded (L3) Ocean Surface Mixed Layer Depth; GRIB format	51	MOD_PR27W
GDAS_0ZF	1 Degree NCEP GDAS	gdas1.PGrb00.yymmdd.hhz	Single Date Time	File covers 6 hours; hhZ-3 hours to hhZ+3 hours	4X Daily 2-D and 3-D Gridded (L3) Met Data; mainly 3-D; GRIB format	03	MOD_PR35 MOD_PR07
						04	MOD_PR04_05
						06	MOD_PR06CT MOD_PR06OD
						11	MOD_PR09
						17	MOD_PRNMC (2)
NISE	Near Real-Time SSM/I EASE-Grid Daily Global Ice Concentration and Snow Extent Product	NISE_SSMIF13.yyyymmdd. .HDFEOS	Range Date Time	Daily file covering 00Z hour to 24Z hour; last available observation for each pixel for the day	Daily Gridded (L3) SSM/I Microwave Sensor, EASE-Grid equal area projection; two 25-km azimuthal, equal area projections; Northern Hemisphere low resolution (NL) and Southern Hemisphere low resolution (SL); HDF_EOS format	03	MOD_PR35 MOD_PR07
						06	MOD_PR06CT, MOD_PR06OD

Table 3-4. MODIS Time-Varying Ancillary Data ESDTs (Con't)

ESDT	Data Set Description	File Name	Metadata Type	Time Range of Data in File	Data Type Description	PGE	Process
OZ_DAILY	TOVS Column Ozone Daily Product	yymmdd.grb	Single DateTime	Daily file (averaged data) 00Z hours to 24Z hours; Time of Day in metadata is set to 12Z	Daily 2-D Column Integrated Gridded (L3) Ozone; GRIB format	03	MOD_PR35, MOD_PR07
						04	MOD_PR04_05
						06	MOD_PR06CT MOD_PR06OD
						11	MOD_PR09
OZONEEP	TOMS Column Ozone (Earth Probe)	gayymmdd.ept	Single DateTime	Daily file (averaged data) 00Z hours to 24Z hours; Time of Day in metadata is set to 12Z	Daily 2-D Column Integrated Gridded (L3) Ozone; ASCII format	19	MOD_PROZN (2)
REYNSST	Reynolds Weekly SST	oi.mean.bias.yymmdd	Range DateTime	Weekly data file; dd denotes middle day of 7-day period; exact start and end days in header; Start at 00Z hour on first day of week and end at last hour, minute, and second on last day of week; each day is 00Z to 24Z hours	Weekly 2-D Gridded (L3) SST from AVHRR; ASCII format	03	MOD_PR35, MOD_PR07
						04	MOD_PR04_05
						06	MOD_PR06CT MOD_PR06CD
						09	MOD_PR18
						10	MOD_PR28
SEA_ICE	NCEP Ice Concentration at 0.5 Degree Latitude/Longitude Projection	eng.yymmdd	Single DateTime	Daily file; 00Z -12 hours to 00Z +12 hours (00 denotes 00Z on day yymmdd)	Daily Gridded (L3) Sea Ice from SSMI Microwave sensor; Sea Ice Modeler's Grid Data; Lat/Lon Projection; GRIB format	03	MOD_PR35, MOD_PR07
						04	MOD_PR04_05
						06	MOD_PR06CT MOD_PR06OD

Table 3-5. Ancillary Data Used by MODIS through SDP Toolkit

ESDT	File Name	Data Type Description	Process
DEM_1KM	dem30ARC_E60N0 dem30ARC_E60N90 dem30ARC_W180N0 dem30ARC_W180N9 dem30ARC_W60N0 dem30ARC_W60N90	Digital elevation model data sets in Geographic Projection at 30 arc second resolution in HDF-EOS GRID format to be read via the SDP Toolkit (MODIS plans to use 30 arc second resolution only)	MOD_PR03
AM1EPHN0	AM1EPHN0#vvvmmddyyyhhmmss... where vvv = version id, mm = month, dd = day, yyyy = year, hh = hour, mm = minutes, ss = secs, etc.	Spacecraft ephemeris/orbit data files to be read via SDP Toolkit, native format, where N = native and 0 = spacecraft Level 0; 2-hour file	MOD_PR03, MOD_Prmsbin MOD_PRpred
AM1ATTNF	AM1ATTNF#vvvmmddyyyhhmmss ... where vvv = version id, mm = month, dd = day, yyyy = year, hh = hour, mm= minutes, ss = secs, etc.	Spacecraft definitive attitude data files to be read via SDP Toolkit, native format, where N = native and F = Flight Dynamics Division (FDD); 2-hour file	MOD_PR03
PM1EPHND	PM1EPHND#vvvmmddyyyhhmmss... where vvv=version id, mm=month, dd = day, yyyy = year, hh = hour, mm= minutes, ss = secs, etc.	Spacecraft ephemeris/orbit data files to be read via SDP Toolkit, where N=native format and D=definitive; daily file	MOD_PR03, MOD_Prmsbin MOD_PRpred
PM1ATTNR	PM1ATTNR#vvvmmddyyyhhmmss... where vvv = version id, mm = month, dd = day, yyyy = year, hh = hour, mm= minutes, ss = secs, etc.	Spacecraft attitude data files, produced from definitive ephemeris data, to be read via the SDP Toolkit, where N=native format and R=refined; 2-hour file	MODPR03
N/A	leapsec.dat	Data file used by the SDP Toolkit that relates leap second (TAI-UTC) values to UTC Julian dates	MOD_PR01, MOD_PR03
N/A	utcpole.dat	Data file used by the SDP Toolkit that relates UT1-UTC values to UTC dates	MOD_PR03
N/A	de200.eos	Planetary ephemeris files from the Jet Propulsion Laboratory	MOD_PR03

Table 3-6. Oceans ESDTs to Product Longname Mapping

Note: x = A, B, D, E, F, M, N, R, W

L2	L3	Product	long_name (LONGNAME is same with "MODIS V1 L3:" prefixed)
MODOCL2	MODOCx01	MOD18	"Normalized water-leaving radiance at 412 nm"
	MODOCx02	MOD18	"Normalized water-leaving radiance at 443 nm"
	MODOCx03	MOD18	"Normalized water-leaving radiance at 490 nm"
	MODOCx04	MOD18	"Normalized water-leaving radiance at 531 nm"
	MODOCx05	MOD18	"Normalized water-leaving radiance at 555 nm"
	MODOCx06	MOD18	"Normalized water-leaving radiance at 667 nm"
	MODOCx07	MOD18	"Normalized water-leaving radiance at 678 nm"
	MODOCx08	MOD37	"Aerosol optical thickness at 865 nm"
	MODOCx09	MOD37	"Epsilon of aerosol correction at 765 and 865 nm"
	MODOCx10	MOD37	"Aerosol model identification number 1"
	MODOCx11	MOD37	"Aerosol model identification number 2"
	MODOCx12	MOD39	"Epsilon of clear water aerosol correction at 531 and 667 nm"
MODOCL2A	MODOCx13	MOD19	"CZCS-like pigment concentration"
	MODOCx14	MOD19	"MODIS chlorophyll concentration"
	MODOCx15	MOD19	"Total case 1 pigment concentration"
	MODOCx16	MOD20	"Chlorophyll fluorescence line height"
	MODOCx17	MOD20	"Chlorophyll fluorescence baseline"
	MODOCx18	MOD20	"Chlorophyll fluorescence line efficiency"
	MODOCx19	MOD23	"Suspended-solids concentration in ocean"
	MODOCx20	MOD25	"Pigment concentration in coccolithophore blooms"
	MODOCx21	MOD25	"Concentration of detached coccolithophores"
	MODOCx22	MOD25	"Calcite concentration"

Table 3-6. Oceans ESDTs to Product Longname Mapping (con't)

L2	L3	Product	Long_name (LONGNAME is same with "MODIS V1 L3" prefixed)
MODOCL2A	MODOCx23	MOD26	"Ocean water diffuse attenuation coefficient at 490 nm"
	MOCOCx24	MOD31	"Phycoerythrobilin concentration"
	MODOCx25	MOD31	"Phycourobilin concentration"
MODOCL2B	MODOCx26	MOD21	"Chlorophyll a concentration (2 band)"
	MODOCx27	MOD21	"Chlorophyll a concentration (3 band)"
	MODOCx28	MOD22	"Instantaneous photosynthetically available radiation"
	MODOCx29	MOD22	"Photosynthetically available radiation"
	MODOCx30	MOD24	"(Seawater light) absorption coefficient, gelbstof at 400nm"
	MODOCx31	MOD36	"Chlorophyll absorption at 675nm"
	MODOCx32	MOD36	"Total absorption at 412nm"
	MODOCx33	MOD36	"Total absorption at 443nm"
	MODOCx34	MOD36	"Total absorption at 488nm"
	MODOCx35	MOD36	"Total absorption at 531nm"
	MODOCx36	MOD36	"Total absorption at 551nm"
MOD28L2	MOD28xD1	MOD28	"Sea Surface Temperature"
	MOD28xD2	MOD28	"Sea Surface Temperature, 4 micrometer"
	MOD28xN1	MOD28	"Sea Surface Temperature"
	MOD28xN2	MOD28	"Sea Surface Temperature, 4 micrometer"

4. PRODUCT GENERATION EXECUTIVES

The following sections contain a more detailed description for each of the MODIS PGEs with an emphasis on the data processing aspects. An abbreviated subset of the structural information, input and output data sets, and processing parameters are shown in Table 3-2. All of the data processing descriptions use the MODIS Terra product names. The data processing for Aqua is expected to be identical to the data processing for Terra. Additional details about the input and output files are shown in Tables 3-3-1, 3-3-2, 3-4, 3-5, and 3-6. For both input and output MODIS products, only the Terra ESDTs are shown in this document. In the ESDT ShortName a substitution in the first two characters of "MY" for "MO" will convert the Terra name to the Aqua name. In the ESDT LongName a substitution of "Aqua" for "Terra" will convert the Terra name to Aqua name. For PGEs using the ephemeris data and attitude data, the Aqua ephemeris and attitude ESDTs are named and the data processing is described where necessary because there are some significant differences between Terra and Aqua.

The individual PGE descriptions assemble the information in the tables and provide additional details that are required to integrate and test the PGEs and build a data production scenario for operations. The ECS Production Rules available for Release B.0 are listed in Appendix C. The construction of the production scenario from the basic, available production rules is described in Section 5.

PGE Information

For each PGE, the following information is provided:

A Brief Description of the PGE

- Purpose of the PGE (including the products generated);
- PGE structure, including both a brief description of the processes and a data flow diagram if there are multiple processes, except for the Land metadata QA process that runs for all Land PGEs, the PGE02 metadata process, and processes that run independently within the same PGE;
- Summary of production under MODAPS V1;
- Summary of production under MODAPS V2;
- Summary of the Production Rules for the PGE, including differences for each PGE profile. This document does not include some of the low-level details for all PGEs (e.g., individual data set time-out periods) since these details must be estimated at delivery and fine-tuned at the GSFC DAAC and at MODAPS;

- List of primary Production Rules used by the PGE. A discussion of the runtime parameters for a PGE is generally included only if the values are to be dynamically inserted into the PCF when the PGE is executed or if the runtime parameters are used to distinguish among the profiles of the PGE. The Runtime Parameters Production Rule is specified for a PGE in the Production Rule list only when the values are dynamically inserted into the production requests on a routine basis by the ECS or MODAPS planning system. Some PGEs and their profiles have static runtime parameters, with associated logical IDs and values, defined in their PCFs. The PGE is run on a routine basis using the static runtime parameter values as defined in the PCF during PGE registration at SSI&T at the GSFC DAAC or as built by the PGE scripts in MODAPS. Most of the static runtime parameters are not discussed in any great detail, except for the ones that determine differences in output products from operational scenarios. The major dynamic and static runtime parameters are discussed after the products .
- PGE profiles (if any exist) to be registered and installed in the production system.

Static Input to the PGE

Static ESDT collections are used as containers to group and organize static files delivered by the Science Instrument Teams and their software developers as input for the PGEs. These ESDTs are sometimes called “Bucket ESDTs”. These input files are called “static” files because they are used only as input to the PGEs and their contents do not change as frequently as the dynamic input files and output files from the PGE executions. If their contents do change, either a new version of the PGE must be delivered with the modified files or a different version number must be appended to the filenames of the updated files so that the older files may be replaced for operations and the change may be tracked by configuration management.

Detailed descriptions of the contents of the ESDTs that contain static files, such as look-up tables, coefficient files, and climatological data sets to be input to the PGEs, are found in Table 3-3-2. For each of the static input ESDTs, this document contains a one-line description in a semi-table format:

ShortName – Earth Science Data Type (limited to 8 characters) required to uniquely identify the data set in the ECS Database and the MODAPS Database. For collections at the GSFC DAAC, the ShortName is defined in the ESDT descriptor configured in the ECS Database at the DAACs. For MODAPS, the

ESDT is used to group the static input files for tracking and documentation purposes.

LongName – A more detailed description (limited to 80 characters), in MODIS static ESDT standard format, for the ESDT collection. For collections at the GSFC DAAC, the LongName is defined in the ESDT descriptor configured in the ECS Database at the DAACs.

Dynamic Product Input to the PGE

Detailed descriptions of the MODIS files can be found in the MODIS Processing Files Description document. All of the MODIS dynamic input ESDTs are listed and described in Table 3-3-1. For each of the input ESDTs, this document contains a one-line description of the input product:

ShortName – Earth Science Data Type (limited to 8 characters) required to uniquely identify the data set in the ECS Database and the MODAPS Database. For multi-type granule ESDTs at the DAACs, the MODAPS extension of 2 characters (not to exceed the 8-character total) to uniquely identify each type of granule or parameter in MODAPS is appended at the end of the ShortName. An explanation of the 2 characters is included. In the document the two appended characters in lower case letters equate to one of the MODAPS ESDTs in the list. At MODAPS the 2 characters in the expanded ESDT name are in upper case letters or numerals.

LongName – A more detailed description (limited to 80 characters), in MODIS standard format, for the ESDT product. The LongName is defined in the ESDT descriptor configured in the ECS Database at the DAACs.

Any unique feature or function for the data set in the PGE, e.g., specification that a previous file is to be staged or a listing of MODAPS specific ESDTs comprising the multi-type granule ESDT for the DAAC. This information is enclosed in parentheses.

Required or Optional Input – An identification of whether the granules of this ESDT are required for the PGE to run or whether they are optional and the PGE can be run without them are indicated in parentheses: Values = **R** for required or **O** for optional. If both **R** and **O** are listed for the input ESDT, then multiple files of this ESDT are expected, such as a granule with a date and time range matching

the current processing period is required and a granule from a previous or subsequent date and time range is optional.

Minimum Number of Granules – The number in the last field indicates the minimum number of granules required for the PGE to be run. A number of “0” means the input is optional. Many of the required ESDTs have a value of “1”. Unless the one particular required granule is unique for the PGE run, the value of “1” indicates that Operations has been given a wait time for the input granules and when the time expires, the PGE is to run if there is at least one granule of this ESDT available.

Dynamic Ancillary Product Input

Ancillary data files from external organizations are also included as inputs to the PGEs. Dynamic ancillary data ESDTs are listed and described in Tables 3-4 and 3-5. On ingest of ancillary data, ECS associates date and time range metadata with each granule. For ancillary data based on predictions centered on a nominal verify time (Z time), the algorithm acquiring the data granules associates \pm half the time interval between the nominal verify times with each current ancillary file. For PGE production requests, the SDPS stages an ancillary data file whose nominal verify time is nearest the science granule start time. This may require setting delta times to the start and end of the processing period. Different algorithms will be required to determine the delta times for each type of ancillary data. The fields in the one line description are the same as the fields for MODIS input ESDTs.

Dynamic Output Generated by the PGE

Detailed descriptions of the MODIS files can be found in the MODIS Processing Files Description document. All of the MODIS dynamic output ESDTs are listed and described in Table 3-3-1. For each of the output ESDTs, this document contains a one-line description of the output product:

ShortName – Earth Science Data Type (limited to 8 characters) required to uniquely identify the data set in the ECS Database and the MODAPS Database. For multi-type granule ESDTs at the DAACs, the MODAPS extension of 2 characters (not to exceed the 8-character total) to uniquely identify each type of granule or parameter in MODAPS is appended at the end of the ShortName. An explanation of the 2 characters is included. In the document the two appended characters in lower case letters equate to one of the MODAPS ESDTs in the list.

At MODAPS the 2 characters in the expanded ESDT name are in upper case letters or numerals.

LongName – A more detailed description (limited to 80 characters), in MODIS standard format, for the ESDT product. The LongName is defined in the ESDT descriptor configured in the ECS Database at the DAACs.

Any unique feature or function for the data set in the PGE, e.g., a listing of MODAPS specific ESDTs comprising the multi-type granule ESDT for the DAAC or a designation of this ESDT as a future product. This information is enclosed in parentheses.

Archived or Interim Product Output – An identification of whether the granules of this ESDT are archived or interim products. In this document a label of Interim means archived for a specified period of time, usually long enough for validation and QA of the products.

At the DAACs the labels mean the following:

(A_D) - Means the product will be archived on tapes or other media for a long period of time at the DAAC.

(I_D) - Means the product will be archived for only a specified, interim short period of time, which must be specified on delivery of the PGE to the GSFC DAAC or product to any of the DAACs.

At MODAPS the labels mean the following:

(A_M) - Means the product will be archived at MODAPS for a specified period of time for use in downstream PGEs and for validation and QA by the Science Team. If (A_D) is also specified for this product, it will be exported to one of the DAACs for more permanent archive and will be archived at MODAPS until it has been used for any downstream processing and it has been available to the Science Team for a minimum of 12 days. If (A_D) is not specified for this product, it will be archived for a minimum of 90 days at MODAPS.

(I_M) - Means the product is either a QA/QC or diagnostic type of product that will be archived at MODAPS for a specified short time period at MODAPS for use by the Science Team, but will not be exported to one of the DAACs, or the product is one that will be sent immediately to an SCF or validation site and then deleted in a short period of time.

(**T_M**) – Means the product is a temporary file and will be deleted immediately after the completion of the PGE run.

Number of Granules Output – The number in the last field indicates the expected number of granules of this ESDT to be output during one PGE execution.

List of Dynamic Runtime Parameters

The dynamic runtime parameters include several runtime parameters that the ECS and the MODAPS PDPS makes available to all PGEs. Since these are available to all PGEs, they are listed here but not in the individual PGE descriptions unless they are used in production runs. These parameters and their logical IDs are the following:

Data Collection Start and End Times

10258| Collection (or Data Observation) Start Time (UTC)

10259| Collection (or Data Observation) Stop (End) Time (UTC)

Parameter for Diagnostic Runs

10911| ECS_DEBUG | values: 1=enabled; 0=disabled

Spacecraft Platform

All of the PGEs will use the Data Processing System's dynamic runtime parameter indicating that the production system is processing either Terra or Aqua data. This parameter is the following:

SatelliteInstrument

Spacecraft platform for MODIS Instrument supplied by either MODAPS or ECS PDPS. Values = either AM1M or PM1M.

Ocean Data Day

Many of the Oceans PGEs, starting with the Level 3 Oceans Interim Daily, require specification of the Ocean Data Day using runtime parameters inserted dynamically by the MODAPS PDPS. Both the start and end of the data day are required for the staging of the correct input data granules for the PGE execution. These dynamic runtime parameters are specified by the following:

start dataday-start of the data day in yyyyddd format

end dataday-end of the data day in yyyyddd format

The Ocean data is binned into spatially-defined, rather than temporally-defined data days to perform temporally based binning (i.e., computing daily files). This spatially-based scheme is used to avoid problems inherent with the temporally-based scheme for sun-synchronous polar-orbiting satellite coverages. Some of the problems with the temporally-based scheme include:

- Coverage gaps at day boundaries
- Coincident areas with large temporal differences
- Inconsistent locations for the start and end of data days

An ocean data day can be defined using the following spatially-derived rules:

- The start of an ocean data day, in terms of satellite coverage, commences with the descending crossing of the 180 degree meridian closest to the equator. (This definition also implicitly defines the end of the previous ocean data day.)
- Data east of the 180 degree meridian, collected up to 12 hours after the start of the ocean data day, are excluded.
- Data west of the 180 degree meridian, collected up to 12 hours before the end of the ocean data day, are excluded.
- Data collected up to 100 minutes (orbital period) before the beginning of the ocean data day and covering an area west of the 180 degree meridian, are included to fill gaps south of the first orbit track of the ocean data day.
- Data collected up to 100 minutes after the end of the ocean data day and covering an area east of the 180 degree meridian, are included to fill gaps north of the last track of the ocean data day.
- Satellite scan lines that traverse the 180 degree meridian are broken into separate data days; pixels east of the meridian are assigned to ocean data day k, those to the west are assigned to data day k+1.

Tile Identification

The L2G Land PGEs and higher level Land PGEs generate products on a tile-by-tile basis. The Land tiles are defined in several sets of tile schemes, which were discussed in Section 3 under Land Processing Scenario.

MODAPS implements the Land latitude/longitude tiling by a method which requires its SDPS to insert the TileID only for the L2G Pointers (PGE12) because this is the first PGE in the transition from L2 time-ordered data to L2G tiled data. Subsequent

PGEs can extract the TileID from their input products. The TileID is defined as follows:

TileID – Dynamic runtime parameter inserted by ECS or MODAPS PDPS, which specifies the current TileID from the Tile Scheme registered with the PGE profile.

The TileID is set to be an 8 digit integer. The first digit (the leftmost digit) is used to identify the projection or tiling scheme. The possible values are the following:

- 1 – Integerized Sinusoidal projection
- 2 – Goode's Homolosine projection
- 3 – Lambert Azimuthal Equal-Area projection with projection center at the North Pole
- 4 – Lambert Azimuthal Equal-Area projection with projection center at the South Pole

The second digit is used to specify the tile size; it has three values:

- 1 – full size
- 2 – quarter tile size
- 4 – one-sixteenth tile size

Digits 3 to 5 specify the horizontal tile number and digits 6 to 8 specify the vertical tile number. The ranges of horizontal and vertical tile numbers depend on the projection and tile size. Table 4-1 shows the projection, size, and ranges of the tiles.

Table 4-1. Land Tile Projections, Sizes, and Ranges

Projection	Size	Horizontal Tile Range	Vertical Tile Range
1 & 2	1	0 to 35	0 to 17
1 & 2	2	0 to 71	0 to 35
1 & 2	4	0 to 143	0 to 71
3 & 4	1	0 to 8	0 to 8
3 & 4	2	0 to 17	0 to 17
3 & 4	4	0 to 35	0 to 35

Table 4-2 shows the MODIS Land L2G PGE profiles which use tile schemes. The information from this table is used in building the Production Rules for these L2G PGE profiles. The tile schemes for the downstream L3 PGE profiles are determined by the tile schemes that were used to generate the L2G input products for these PGEs. Most of the Land tiled products are generated in the Integerized Sinusoidal Grid. The Sea Ice Extent tiled products are generated in the EASE-Grid polar projection. MODAPS is able to combine the tile schemes relevant to each product into a single scheme for running the PGEs or run the PGEs separately for each relevant tile scheme.

Table 4-2. MODIS Land L2G PGE Profiles and Tile Schemes

PGE Primary Profile	MOD Recipe	MOD Process	Product	Input ESDT	Output ESDT	Resolution	DayNight Flag Value	Runtime Parameter	Runtime Parameter Value	Tile Schemes	User Params
PGE12.1	L5	MGPNTN	L2G Pointers	MOD03	MODPT1KD	1 km	Day/Both			2	1-8
PGE12.1	L5	MGPNTN	L2G Pointer	MOD03	MODPTHKM	500 m	Day/Both			2	1-8
					MODPTQKM	250 m	Day/Both			38	1-8
PGE12.1	L5	PRMGR	L2G Geoangles	MOD03	MODMGGAD		Day/Both	L_PRODUCT	G	2	1-8
PGE12.1	L5P	MGPNTN	L2G Pointers	MOD03	MODPTPGD	1 km	Day/Both	L_PRODUCT	G	3	1-6
PGE12.1	L5P	PRMGR	L2G Geoangles	MOD03	MODMGGPD	1 km	Day/Both	L_PRODUCT	G	3	1-6
PGE12.2	L5	MGPNTN	L2G Pointers	MOD03	MODPT1KN	1 km	Night			2	1-8
PGE12.2	L5	PRMGR	L2G Geoangles	MOD03	MODMGGAN		Night	L_PRODUCT	g	2	1-8
PGE12.2	L5P	PRMGR	L2G Geoangles	MOD03	MODMGGPN	1 km	Night	L_PRODUCT	g	3	1-6
PGE12.2	L5P	MGPNTN	L2G Pointers	MOD03	MODPTPGN	1 km	Night		g	3	1-6
PGE13.1	L5	PRMGR	L2G Sur. Refl.	MOD09 MODPTHKM	MOD09GHK	500 m	Day/Both	L_PRODUCT	R	2	5, 7
PGE13.2	L5	PRMGR	L2G Sur. Refl.	MOD09 MODPTQKD	MOD09GQK	250 m	Day/Both	L_PRODUCT	r	38	5, 7
PGE13.3	L5	PRMGR	L2G Fire	MOD14 MODPT1KD	MOD14GD	1km	Day/Both	L_PRODUCT	F	2	5, 7
PGE13.4	L5	PRMGR	L2G Sur. Refl. State	MOD09 MODPT1KD	MOD09GST	1 km	Day/Both	L_PRODUCT	t	2	5, 7
PGE13.5	L5	PRMGR	L2G Fire	MOD14 MODPT1KN	MOD14GN	1 km	Night	L_PRODUCT	f	2	5, 7
PGE14	L5	PRMGR	L2G Snow	MOD10_L2 MODPTHKM	MOD10L2G	500 m	Day/Both	L_PRODUCT	s	2	1, 5, 7
PGE15.1	L5	PRMGR	L2G Sea Ice	MOD29 MODPT1KD	MOD29GD	1 km	Day/Both	L_PRODUCT	l	2	1-6
PGE15.2	L5	PRMGR	L2G Sea Ice	MOD29 MODPT1KN	MOD29GN	1 km	Night	L_PRODUCT	i	2	1-6
PGE15.1	L5P	PRMGR	L2G Sea Ice	MOD29 MODPTPGD	MOD29PGD	1 km	Day/Both	L_PRODUCT	l	3	1-6
PGE15.2	L5P	PRMGR	L2G Sea Ice	MOD29 MODPTPGN	MOD29PGN	1 km	Night	L_PRODUCT	i	3	1-6

List of Static Runtime Parameters

The static runtime parameters are listed for each PGE. Typical values of these parameters for operations are shown. However, these values may be changed by the Science Discipline Teams in subsequent versions of the PGEs.

All PGE scripts access the PGE Version from a MODAPS PGE data structure and set the PGE Version as a static runtime parameter for use in the PGE code to write the PGE Version metadata. MODAPS reads the PGE Version from a ciList that must be delivered with each version the PGE code and sets the PGE Version in a PGE data structure.

The general format of the PGE Version is given by one of the following:

PGE Version or PGExx Version - Version of PGExx that appears in the ciList delivered with the code (where xx = PGE version number).

Many of the Land PGEs can be executed in several ways to produce different sets of products. Each of the MODIS Disciplines uses different static runtime parameters. To accomplish this for L2G PGEs, several static runtime parameters must be set in the PCF that is generated at runtime by the PGE script that builds the PCF:

L_Product – Parameter which determines the geolocation angles product: G = day mode, g = night mode.

Exactmatch – Parameter which is used for multi-product runs. ExactMatch means that the number of Exactmatch values shall be the same as that of L_Product values. If one product cannot be generated, then the PGE stops with an error status and the following products are not generated. Values are: Y, N.

Tilemode – Selects either day mode data or night mode data. Values are: Day, Night. For Day mode, granules with the DayNightFlag set to Day or Both are staged. For Night mode, only granules with the DayNightFlag set to Night are staged.

Maxoutputres – Selects the number of output products, which equates to the number of pointer resolutions to be produced. The resolution is indicated in the ShortName of the ESDT product. Values are: 1km, 500m, 250m. The results of selecting each value are the following:

1km – produces only the 1km pointers,

500m – produces 500m and 1km pointers,

250m – produces 250m, 500m, and 1km pointers.

Deepocnflag – Selects all pixels or all but deep-sea pixels. Values are: Yes, No.

The results of selecting each value are the following:

Yes – produces pointer for all pixels,

No – pixels flagged as deep-sea (in the geolocation land-sea mask) are skipped.

In general, this parameter should be set to “Yes” for L2G Sea Ice production and set to “No” for all other L2G products.

Coverage_min – In general, this parameter should be set to 24.0. It may be increased to a higher value to reduce the pointer volume size. The polar areas may require a higher value.

Layer_1st_sel – The first layer selection criteria has the values of either “nearest neighbor” or “maximum observation coverage”. In general, the “maximum observation coverage” should be selected.

Cov_cal_method – Selects the coverage calculation method. Values are: “area” or “simple PSF”. Only the “area” option is currently implemented.

Pntrformat – Selects the output format of the pointer products. Values are: compact, full, “one layer only”. In general, the compact value should be selected to reduce the L2G volume.

L2Gformat – Selects the output format of the geoangles products. Values are: compact, full, “one layer only”. In general, the compact value should be selected to reduce the L2G volume. The value should be the same as the value for Pntrformat for a particular PGE profile.

4.1. Level 1A Raw Radiances and Geolocation (PGE01)

PGE01 represents the MODIS Level 1A (L1A) processing, which is done on a semi “real-time” basis with each Level 0 input file containing two hours of data. The GSFC DAAC runs PGE01 as 15 minute Data Processing Requests (DPRs). This results in 96 runs of this PGE per day executed at GSFC. Each output data granule covers a period of five minutes. The PGE nominally outputs 288 granules of each product per day. The L1A product contains scan and pixel quality data, engineering data, and discarded packets. The Geolocation product contains geodetic position for the center of each 1 km MODIS Earth view observation and other information sufficient to permit geolocation for specific bands and sub-pixel ground location.

Purpose

PGE01 converts the raw (Level 0) data into reconstructed earth-located instrument data.

Structure

PGE01 is comprised of two sequential processing steps: L1A processing (MOD_PR01) and Geolocation processing (MOD_PR03). L1A unpacks and reformats the Level 0 data into scans of MODIS instrument data and writes the MOD01 product. MOD_PR03 (Geolocation) earth-locates the 1 km observations and writes the MOD03 product. MOD_PR03 also updates the metadata for MOD01. Figure 4-1 shows the structure of PGE01.

MODAPS V1 Production

Although PGE01 Production is planned for the GSFC DAAC, it may also be run in MODAPS in an emergency backup scenario or for testing purposes. PGE01 is run by the MODAPS V1 Loader MD0 upon the receipt of the 2-hour Terra MODIS L0 (MOD000) granules, the spacecraft ephemeris (AM1EPHN0) and spacecraft attitude (AM1ATTNF) for this time period from the GSFC DAAC. The corresponding Aqua granules are the 2-hour MODIS L0 (MYD000), the daily spacecraft ephemeris (PM1EPHND), and the 2-hour spacecraft attitude (PM1ATTNR). The current utcpole.dat and leapsec.dat files must also be installed at MODAPS. Each execution of PGE01 in MD0 generates a set of 5-minute granules of MOD01 and MOD03. A total of 24 granules of each ESDT are produced for the 2-hour MOD000 granule. These products would be archived at MODAPS only if they are produced at MODAPS.

MODAPS V2 PRODUCTION

Although PGE01 Production is planned for the GSFC DAAC, it may also be run in MODAPS in an emergency backup scenario or for testing purposes. PGE01 is run by the MODAPS V2 Recipe AM1M_0 upon the receipt of the 2-hour Terra MODIS L0 (MOD000) granules, the spacecraft ephemeris (AM1EPHN0) and spacecraft attitude (AM1ATTNF) for this time period from the GSFC DAAC. The corresponding Aqua granules are the 2-hour MODIS L0 (MYD000), the daily spacecraft ephemeris (PM1EPHND), and the 2-hour spacecraft (PM1ATTNR). The current utcpole.dat and leapsec.dat files must also be installed at MODAPS. Each execution of PGE01 in MD0 generates a set of 5-minute granules of MOD01 and MOD03. A total of 24 granules of each ESDT are produced for the 2-hour MOD000 granule. These products would be archived at MODAPS only if they are produced at MODAPS.

Production Rules

PGE01 is data driven. It is executed when new Level 0 data are available from EDOS approximately every two hours. However, the GSFC DAAC will run the PGE in 15 minute segments. MOD000 is a required input. There are no other data product dependencies for MOD_PR01. Note that both the current and previous Level 0 files are preferred for PGE01 because up to 70 seconds of the engineering packets data for the current processing period may be available only in the previous Level 0 file. Thus a negative delta time should be applied to the current processing start time to acquire the previous granule for a run of PGE01. In addition EDOS separates the data packets exactly at the end of the two hours. This sometimes causes packets that belong to the same MODIS scan at the beginning of the 2 hours to be put into the previous 2-hour granule. Thus the scheduler for PGE01 offsets the start of the data processing of the current 2-hour MOD000 granule to the last 5 minutes in the previous MOD000 granule. The scheduler for PGE01 ends the data processing of the current 2-hour MOD000 granule 5 minutes before the end of the file. The last 5-minute set of output granules will thus have a time stamp of 5 minutes before the end of the second hour in the current MOD000 file.

A time-out for the availability of the previous granule is set so that the data for the current period can be processed without the previous granule if necessary. Because the PGE may be run without the previous granule of MOD000, the previous granule is registered as an Optional Input at SSI&T and is read under a different logical unit number in the PCF. Due to the large size of the MOD000 granules, EDOS must break the granule into several files. MOD000 has multi-file granules.

MOD_PR03 also requires the spacecraft attitude and ephemeris files, the Planetary Ephemeris file from the Jet Propulsion Laboratory, the current leapsec.dat file, the current utcpole.dat file, and the digital elevation model files, MOD_PR01 also uses the current leapsec.dat file. All of these ancillary files are read through calls to the SDP Toolkit.

The Production Rules for PGE01 are the following:

- Basic Temporal
- Advanced Temporal
- Optional Inputs

The geolocation process (MOD_PR03) also has the capability of reading spacecraft attitude and ephemeris data from ancillary packets in the L1A (MOD01) product. However, these data are not valid during the spacecraft maneuvers. To use this alternative capability, PGE01 can be configured in another profile which would not require the external attitude file. The PGE01 profile would still require the ephemeris files. This alternate capability is not currently being activated in production.

Data Files

Static Input ESDT

MOD01LUT	MODIS/Terra Engineering List of Data Structures for production of MOD01
MOD03LUT	MODIS/Terra input instrument and satellite parameters for production of MOD03

Dynamic Product Input ESDT

MOD000	MODIS/Terra Raw Instrument Packets 2-Hr L0 Swath (R) 1, (O) 1
MYD000	MODIS/Aqua Raw Instrument Packets 2-Hr L0 Swath (R) 1, (O) 1

Static Ancillary Input

Digital Elevation	ModelDigital elevation data sets in Geographic Projection at 30 arc second resolution in HDF-EOS GRID format to be read via the SDP Toolkit
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Dynamic Ancillary Product Input

AM1EPHN0	Terra 2-hour spacecraft ephemeris/orbit data files to be read via SDP Toolkit (R) 1, (O) 1
AM1ATTNF	Terra 2-hour spacecraft attitude data files to be read via SDP Toolkit (R) 1, (O) 1
PM1EPHND	Aqua daily spacecraft ephemeris/orbit data files to be read via SDP Toolkit (R) 1, (O) 1
PM1ATTNR	Terra 2-hour spacecraft attitude data files to be read via SDP Toolkit (R) 1, (O) 1
leapsec.dat	Data file used by the SDP Toolkit that relates leap second (TAI-UTC) values to UTC Julian dates (R) 1
utcpole.dat	Data file used by the SDP Toolkit that relates UT1-UTC values to UTC dates (R) 1

Dynamic Product Output ESDT

MOD01	MODIS/Terra Raw Radiances in Counts 5-Min L1A Swath (A _D) 1*
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (A _D) 1*

Dynamic Runtime Parameters for Operations

Collection Start Time	<Start time for data observations>
Collection Stop Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

*minimum number of granules per PGE01 execution to be considered successful.

Static Runtime Parameters for Operations

Length of L1A granules in seconds	Granule size is read from MODAPS DatabaseTable: MEBS_PARAMETERS; currently set for SDPS to 300 seconds
Scan rate for L1A granule	1.47718144
Source for spacecraft kinematic state	SDP Toolkit
Terrain Correction Flag	TRUE
PGE01 Version	<Version of PGE01 that appears in the ciList delivered with the code>
L1A Version	<Version of MOD_PR01 which is updated when new versions of the code are delivered.
	First value for MODIS Version 3 reprocessing = 3.0.0>
LOCAL VERSIONID	<Version identification for MOD03 filespec: First value for MODIS Version 3 reprocessing = 3.0.0>

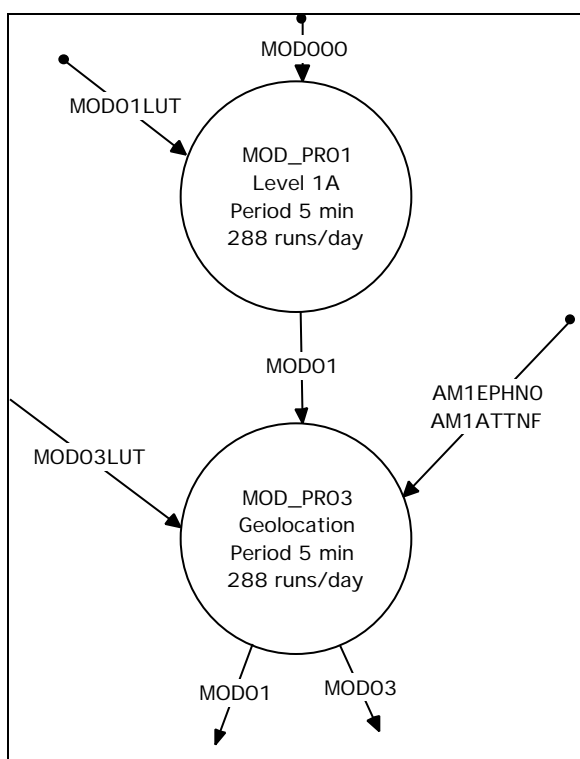


Figure 4-1 PGE01 Structure

4.2. Level 1B Calibration (PGE02)

PGE02 performs the MODIS Level 1B (L1B) processing, which runs on a per-granule basis after PGE01 processing is executed at GSFC.

Purpose

PGE02 converts the raw (L1A) detector counts into fully calibrated radiances.

Structure

PGE02 consists of two processing steps: L1B (MOD_PR02), converts the raw counts into radiances and writes the data products at 1 km resolution (MOD021KM), 500 m resolution (MOD02HKM), and 250 m resolution (MOD02QKM). MOD_PR02 also produces the on-board calibration engineering data (MOD02OBC). MOD_PR02QA produces the QA files for the radiance files (MOD021QA).

MODAPS V1 Production

Although PGE02 production is planned for the GSFC DAAC, it may also be run in MODAPS in an emergency backup scenario or for testing purposes. PGE02 is part of the MODAPS V1 Loader MD1, which is run every 2 hours upon the availability of L1A Raw Radiances and Geolocation granules for this time period. Each execution of PGE02 in MD1 generates a 5-minute granule of each product ESDT. A total of 24 granules of each ESDT are produced in the 2-hour processing period.

MODAPS V2 Production

Although PGE02 production is planned for the GSFC DAAC, it may also be run in MODAPS in an emergency backup scenario or for testing purposes. PGE02 is part of the MODAPS V2 Recipe AM1M_1, which is run every 2 hours upon the availability of L1A Raw Radiances and Geolocation granules for this time period. Each execution of PGE02 in MD1 generates a 5-minute granule of each product ESDT. A total of 24 granules of each ESDT are produced in the 2-hour processing period.

Production Rules

PGE02 is executed once for each 5-minute granule of MOD01 produced by PGE01. The input to PGE02 consists of three granules of MOD01 data (previous, current, following) and one granule of MOD03 data (synchronized with the current MOD01 granule). Delta times of up to 5 minutes must be applied to the current processing start

and end times of PGE02 to retrieve the previous and following granules of MOD01. The total, nominal number of executions is 288 per day.

Only MOD03 and the current granule of MOD01 are required for the mission version of PGE02. The previous and following granules of MOD01 are optional inputs.

The Production Rules for the current version are the following:

- Basic Temporal
- Advanced Temporal
- Optional Inputs

Data Files

Static Input ESDT

MOD02LUT	MODIS/Terra Instrument Calibration parameters LUT for production of MOD02. MOD02LUT contains three files consisting of reflective LUTs, emissive LUTs, and QA LUTs.
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Dynamic Product Input ESDT

MOD01	MODIS/Terra Raw Radiances in Counts 5-Min L1A Swath (R) 1 (O) 2
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1

Dynamic Product Output ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (A _D) 1
MOD02HKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 500m (A _D) 1
MOD02QKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250m (A _D) 1
MOD02OBC	MODIS/Terra On-Board Calibrator and Engineering Data 5-Min L1B (A _D) 1
MOD021QA	MODIS/Terra QA Summary of Calibrated Radiances 5-Min L1B 1km (A _D) 1

Dynamic Runtime Parameters for Operations

SatelliteInstrument <Spacecraft platform for MODIS
Instrumentsupplied by MODAPS. Value =
{AM1M, PM1M}>

Static Runtime Parameters for Operations

PGE02 Version <Version of PGE02 that appears in the ciList
delivered with the code.>

4.3. Level 2 Cloud Mask/Atmospheric Profiles (PGE03)

PGE03 is the first step in the L2 processing of the MODIS data. It consists of some atmospheric processes, which produce products needed by other MODIS L2 processes, and is executed at GSFC.

Purpose

PGE03 produces atmospheric products needed by other MODIS processes. These products are Cloud Mask and Spectral Test Results (MOD35_L2) and Profiles of Temperature and Water Vapor (MOD07_L2). It also generates the Volcano Alert message file (MODVOLC) that should be distributed to the originating SCF for analysis.

Structure

PGE03 consists of three processes: Cloud Mask (MOD_PR35), Temperature and Water Vapor Profiles (MOD_PR07), and Volcano Alert (MOD_PRVOLC). Figure 4-2 shows the structure of PGE03.

MODAPS V1 Production

Although PGE03 production is planned for the GSFC DAAC, it may also run in MODAPS in an emergency backup scenario or for testing purposes. PGE03 is part of MODAPS V1 Loader MD1, which is run every 2 hours upon the availability of L1A Raw Radiances and Geolocation granules for this time period. Each execution of PGE03 in MD1 generates a 5-minute granule of each product ESDT. A total of 24 granules of each ESDT are produced in the 2-hour processing period.

MODAPS V2 Production

Although PGE03 production is planned for the GSFC DAAC, it may also run in MODAPS in an emergency backup scenario or for testing purposes. PGE03 is part of MODAPS V2 Recipe AM1M_1c, which is run every 2 hours upon the availability of L1A Raw Radiances and Geolocation granules for this time period. Each execution of PGE03 in AM1M_1c generates a 5-minute granule of each product ESDT. A total of 24 granules of each ESDT are produced in the 2-hour processing period.

Production Rules

PGE03 runs once for each five minute MODIS calibrated radiance granule. The operational scenario is nominally 288 activations per day, representing the processing of one granule per PGE execution.

The required inputs are one granule each of MOD03 and MOD021KM. MOD02QKM is an optional input. MOD_PR35, and MOD_PR07 also read ancillary files that should be available before processing begins. No wait times are specified for any of the PGE03 optional MODIS and ancillary input products. However, 4-day search intervals centered on the collection period are specified for the NISE and OZ_Daily products, and 28 day centered search interval for SEA_ICE. If the REYNSST product that overlaps the collection period is unavailable, the prior week is chosen as a first alternative and the next week as second alternative. Using the Advanced Temporal Production Rule, delta times are specified to the start and end of the data processing period to retrieve the ancillary data that best matches the granule time of the MOD02 calibrated radiances and MOD03 Geolocation. The algorithms for setting the delta times in the start and end of the data processing period for these ancillary data sets are described in Section 5.8, Advanced Temporal Production Rule. Since the weekly REYNSST would not be available until the end of the current week, the prior week's REYNSST will be used rather than the current week's file. The MODCSR_8 is an optional input, which will be available in the future.

In MODAPS the Ancillary data would be staged using an extension to the Advanced Temporal Production Rule:

- GDAS_0ZF, OZ_DAILY, and SEA_ICE contain ECS SingleDateTime metadata. MODAPS selects the ancillary granule within the allowed search interval whose SingleDateTime is nearest the midpoint of the MODIS output granule collection period.
- NISE contains ECS RangeDateTime metadata. MODAPS selects the ancillary granule whose RangeDateTime midpoint is within the search interval and is nearest the midpoint of the MODIS output granule collection period.
- REYNSST contains ECS RangeDateTime metadata. MODAPS selects the ancillary granule that overlaps the granule collection period. If this granule is unavailable, use the week immediately prior. If the prior-week granule is also unavailable, use the subsequent week.

Static inputs include the Olson World EcoSystem Maps at both 1km and 10 minute climatology data sets and a MOD_PR35 thresholds parameter file. Separate regression coefficient and MODIS sensor zenith angle parameter files are used by MOD_PR07. The Post-Launch version of PGE03 may also use optional inputs of Clear Sky Radiances (MODCSR_8) and L3 gridded weekly Snow Cover products.

The Volcano Alert message file is an interim product that may be deleted after it is distributed to the SCF for analysis. The short and long durations for keeping the interim MODVOLC is required for use in the PDPS. The MOD35_QC and MOD07_QC are also interim products. Specification of short and long durations for these ESDTs is required at registration of the PGE.

The Production Rules for PGE03 are:

- Basic Temporal
- Advanced Temporal
- Optional Inputs

Data Files

Static Input ESDT

MOD35ANC	MODIS/Terra Olson World Ecosystem Maps at 10 minute and 1km resolution and Cloud Mask Thresholds Parameter File
MOD07LUT	MODIS/Terra Regression Coefficients and MODIS Sensor Zenith Angle Parameter Files

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD02QKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250m (O) 0
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1
MODCSR_8	MODIS/Terra Clear Sky Radiance Running Statistics 8-Day L3 Global 25km CMG (Future) (O) 0

Dynamic Ancillary Product Input ESDT

GDAS_OZF	1 Degree NCEP GDAS (O) 0
OZ_DAILY	TOVS Column Ozone Daily Product (O) 0
SEA_ICE	NCEP Ice Concentration at 0.5 Degree Lat/Lon Projection (O) 0
NISE	Near Real-time SSM/I EASE-Grid Daily Global Ice Concentration and Snow Extent Product (O) 0
REYNSST	Reynolds Weekly SST (previous week) (O) 0

Dynamic Product Output ESDT

MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (A _D) 1
MOD07_L2	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km (A _D) 1
MODVOLC	MODIS/Terra Volcano Alert 5-Min L2 (I _D) 1
MODCSR_G	MODIS/Terra Clear Sky Radiances Statistics 5-Min L2 25km (I _D) 1

Quality Control or Diagnostic Output ESDT

MOD35_QC	MODIS/Terra Cloud Mask and Spectral Test Diagnostics 5-Min L2 250m and 1km (I _D) 1
MOD07_QC	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km (I _D) 1

Temporary Output Files

Two sets of temporary files for each ancillary data set:

Reformatted GDAS_OZF data used by MOD_PR35 and MOD_PR07

Reformatted OZ_DAILY data used by MOD_PR35 and MOD_PR07

Reformatted SEA_ICE data used by MOD_PR35 and MOD_PR07

Dynamic Runtime Parameters for Operations

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>

SatelliteInstrument

<Spacecraft platform for MODIS
Instrument supplied by MODAPS,
Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

PROCESSINGACTUAL	processed once
REPROCESSINGPLANNED	further update is anticipated
LOCALVERSIONID	003
PGEVERSION	<Version of PGE03 that appear In the ciList delivered with theCode>
ALGORITHMPACKAGEACCEPTANCEDATE	June 1997
ALGORITHMPACKAGEMATURITYCODE	at-launch
ALGORITHMPACKAGENAME	ATBD-MOD-07
ALGORITHMPACKAGEVERSION	2
INSTRUMENTNAME	Moderate Resolution Imaging Spectroradiometer
Profiles_Algorithm_Version_Number	1
Total_Ozone_Algorithm_Version_Number	1
Stability_Indices_Algorithm_Version_Number	1
REPROCESSINGACTUAL	processed once
REPROCESSINGPLANNED	further update is anticipated
LOCALVERSIONID	<Value of Collection Versions. Current value = 003.>
PGEVERSION	<Version of PGE03 that appears in the ciList delivered with the code>
ALGORITHMPACKAGEACCEPTANCEDATE	June 1997
ALGORITHMPACKAGEMATURITYCODE	at-launch
ALGORITHMPACKAGENAME	ATBD-MOD-06
ALGORITHMPACKAGEVERSION	2
INSTRUMENTNAME	TestResults Moderate Resolution Imaging Spectroradiometer
UW DEBUG; 0 to 4, no output to reams	0
Processing Range Begin Line	0
Processing Range Number of Lines	0
Processing Range Begin Element	0
Processing Range Number of Elements	0

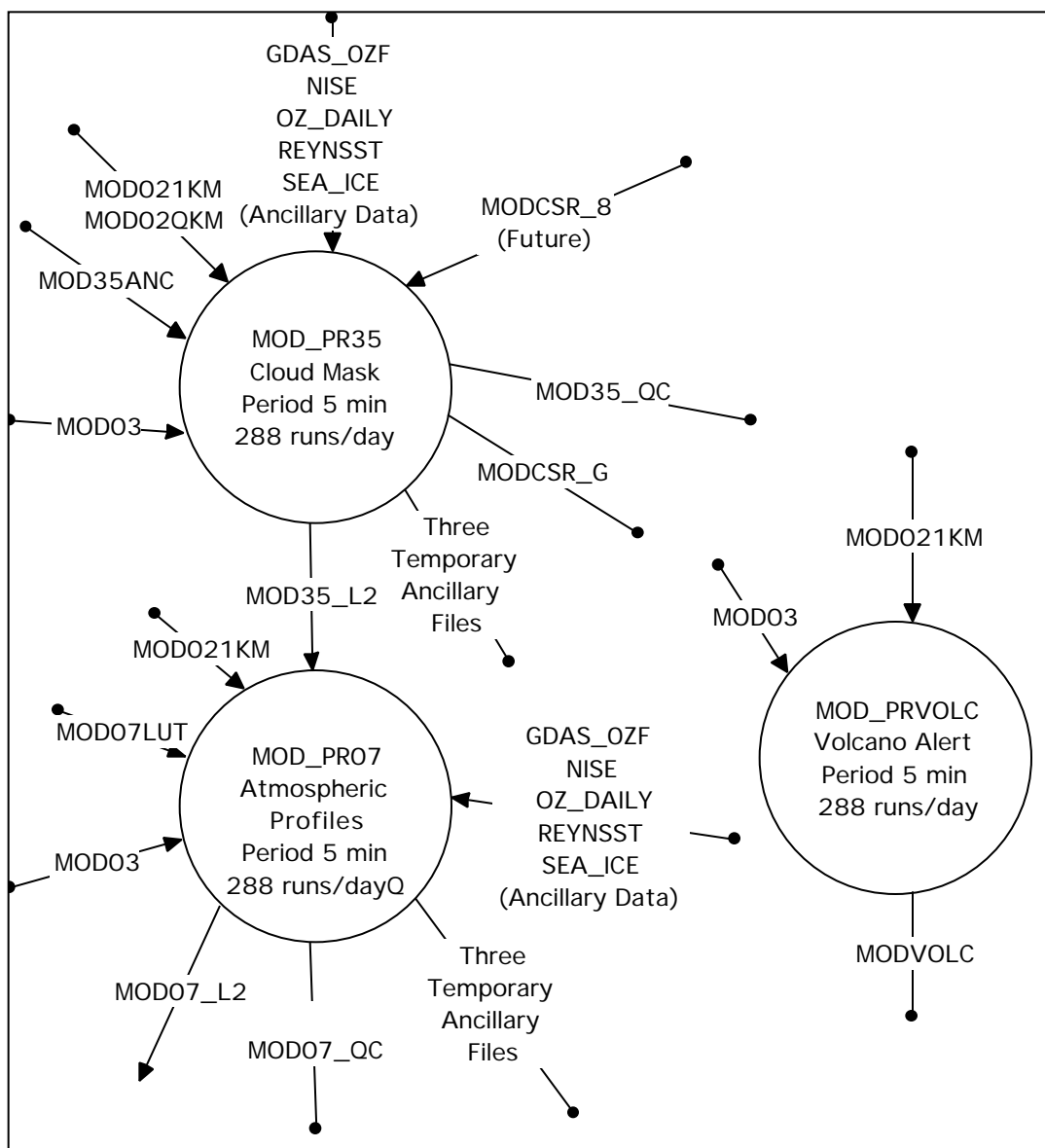


Figure 4-2 PGE03 Structure

4.4. Level 2 Atmosphere (PGE04)

PGE04 represents the second step in the atmosphere L2 processing executed at MODAPS.

Purpose

PGE04 produces the day-only atmosphere Aerosol product (MOD04_L2) and the Total Precipitable Water Vapor (MOD05_L2) which is produced both during the day and at night.

Structure

PGE04 is comprised of a single L2 atmosphere processing step (MOD_PR04_05).

MODAPS V1 Production

PGE04 is run in MODAPS V1 Loader MDA1, which is executed every two hours upon the availability of MOD021KM, MOD02HKM, MOD02QKM, MOD03, MOD35_L2, MOD07_L2, GDAS_0ZF, OZ_DAILY, REYNSST, and SEA-ICE granules covering the processing period. Products archived at MODAPS are 5-minute granules of MOD04_L2 and MOD05_L2 covering the two-hour processing period. MODAPS exports MOD04_L2 and MOD05_L2 to the PDR Server for archive and distribution at the GSFC DAAC. MODAPS Interim products for the same period are granules of MOD04_QC, MOD05_QC, and MOD5C_QC.

MODAPS V2 Production

PGE04 is run in MODAPS V2 Recipe AM1M_A1, which is executed every two hours upon the availability of MOD021KM, MOD02HKM, MOD02QKM, MOD03, MOD35_L2, MOD07_L2, GDAS_0ZF, OZ_DAILY, REYNSST, and SEA_ICE granules covering the processing period. A 28-day search interval centered on the collection period is specified for the OZ_DAILY, REYNSST and SEA_ICE products. The ancillary granule with center point in the search interval and nearest to the MODIS collection period midpoint is chosen. Products archived at MODAPS are 5-minute granules of MOD04_L2 and MOD05_L2 covering the two-hour processing period. MODAPS exports MOD04_L2 and MOD05_L2 to the PDR Server for archive and distribution at the GSFC DAAC. MODAPS Interim products for the same period are granules of MOD04_QC, MOD05_QC, and MOD5C_QC.

Production Rules

PGE04 runs once for each five minute MODIS L1B granule. The top level Production Rule is Basic Temporal. The operational scenario is nominally 288 activations per day.

The required inputs for PGE04 are MOD03 from PGE01; MOD021KM, MOD02HKM, and MOD02QKM from PGE02; MOD07_L2 and MOD35_L2 from PGE03. The required inputs also include ancillary data sets: GDAS_0ZF, OZ_DAILY, REYNSST, and SEA_ICE. The climatology data for PGE04 include the static input files in the LUTs described below.

Using the MODAPS extension of the Advanced Temporal Production Rule, the Production System retrieves the ancillary files that best match the processing period.

- The GDAS_0ZF, OZ_DAILY and SEA_ICE products contain ECS SingleDateTime metadata. MODAPS selects the ancillary data granule whose SingleDateTime is within the search interval and nearest the MODIS collection period midpoint.
- The REYNSST product contains ECS RangeDateTime metadata. MODAPS selects the ancillary granule whose midpoint (a Wednesday at 12Z GMT) is within the search interval and nearest the MODIS collection period midpoint.

If the scene data contains day mode data, defined by MinSolarZenithAngles<72° as read from the PSA in the upstream MOD35_L2 product, PGE04 performs the retrieval of aerosol and near-infrared total precipitable water vapor and outputs both science products (MOD04_L2 and MOD05_L2). If the input data contain night mode data, defined by MinSolarZenithAngle 72°, PGE04 performs only the copying of total precipitable water derived from infrared channels from MOD07_L2 into the science product (MOD05_L2). MOD04_L2 is not produced at night. All of the QC products (MOD04_QC, MOD05_QC, and MOD5C_QC) are interim products.

The Production Rules for PGE04 are:

Basic Temporal

Advanced Temporal

Data Files

Static Input ESDT

MOD04LUT

MODIS/Terra Radiative Transfer LUTs for Production of MOD04_L2

MOD5CLUR	MODIS/Terra Atmospheric Correction Reflectance and Channel Ratio LUT for Production of MOD05_L2.
MOD05LUR	MODIS/Terra Radiative Transfer LUTs for Production of MOD05_L2
MOD05LUW	MODIS/Terra Weight Factors LUT for Production of MOD05_L2

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD02HKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 500m (R) 1
MOD02QKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250m (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (R) 1
MOD07_L2	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km (R) 1

Dynamic Ancillary Product Input ESDT

GDAS_0ZF	1 Degree NCEP GDAS (R) 1
OZ_DAILY	TOVS Column Ozone Daily Product (R) 1
REYNSST	Reynolds Weekly SST (R) 1
SEA_ICE	NCEP Ice Concentration at 0.5 Degree Lat/Lon Projection (R) 1

Dynamic Product Output ESDT

MOD04_L2	MODIS/Terra Aerosol 5-Min L2 Swath 10km (A _M) (A _D) 1
MOD05_L2	MODIS/Terra Total Precipitable Water Vapor 5-Min L2 Swath 1km and 5km (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MOD04_QC	MODIS/Terra	MOD_PR04	Diagnostic	File	for
	Uncorrected Water Vapor 5-Min L2	(I _M)	1		
MOD05_QC	MODIS/Terra	MOD_PR05	Diagnostic	File	for
	Uncorrected Water Vapor 5-Min L2	(I _M)	1		
MOD5C_QC	MODIS/Terra	MOD_PR05	Final Diagnostic	File	for
	Corrected Water Vapor 5-Min L2	(I _M)	1		

Temporary Output Files

Two sets of temporary files for each ancillary data sets:

Reformatted GDAS_0ZF data used by MOD_PR04_05

Reformatted OZ_DAILY data used by MOD_PR04_05

Reformatted SEA_ICE data used by MOD_PR04_05

Dynamic Runtime Parameters for Operations

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM_1, PM-1}>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL	processed once
REPROCESSINGPLANNED	further update is anticipated
LOCALVERSIONID	<Value of Collection Version; current value = 003>
PGEVERSION	<Version of PGE04 that appears in the ciList delivered with the code>
ALGORITHMPACKAGEACCEPTANCEDATE	June 1997
ALGORITHMPACKAGEMATURITCODE	at-launch
ALGORITHMPACKAGENAME	ATBD-MOD-02
ALGORITHMPACKAGEVERSION	2.1
INSTRUMENTNAME	Moderate Resolution Imaging Spectroradiometer
ALGORITHMSOFTWAREVERSIONLand	2.1
ALGORITHMSOFTWAREVERSIONOcean	2.1
REPROCESSINGACTUAL	processed once

REPROCESSIONGPLANNED	further update is anticipated
LOCALVERSIONID	<Value of Collection Version; current value = 003>
PGEVERSION	<Version of PGE04 that appears in the ciList delivered with the code>
ALGORITHMPACKAGEACCEPTANCEDATE	June 1997
ALGORITHMPACKAGEMATURITYCODE	at-launch
ALGORITHMPACKAGENAME	ATBD-MOD-03
ALGORITHMPACKAGEVERSION	2
INSTRUMENTNAME	Moderate Resolution Imaging Spectroradiometer
ALGORITHMSOFTWAREVERSION_NIR	2.1
ALGORITHMSOFTWAREVERSION_IR	2

4.5. Level 3 Orbital Land Aerosol (PGE05)

PGE05 performs the L3 Land Aerosol processing at MODAPS.

Purpose

PGE05 produces the L3 Land Orbital Aerosol Product (MOD04L_O).

Structure

PGE05 consists of the L3 Land Aerosol process (MOD_PR04ORB).

MODAPS V1 Production

PGE05 is run in MODAPS V1 Loader MDL3, which is executed every orbit upon the availability of MOD04_L2. MODAPS stages all input granules whose temporal coverage overlaps the orbit span. Terra orbits start and stop on the ascending node Equator crossing. Products archived at MODAPS are orbital granules of MOD04L_0 covering the orbital processing period. MODAPS archives the MOD04L_0 products and in the future may export them to the PDR Server for Archive and distribution at the GSFC DAAC.

MODAPS V2 Production

PGE05 is run in MODAPS V2 Recipe AM1M_L3, which is executed every orbit upon the availability of MOD04_L2. MODAPS stages all input granules whose temporal coverage overlaps the orbit span. Terra orbits start and stop on the ascending node Equator crossing. Products archived at MODAPS are orbital granules of MOD04L_0 covering the orbital processing period. MODAPS archives the MOD04L_0 products and in the future may export them to the PDR Server for Archive and distribution at the GSFC DAAC. PGE05 is not being run for the Consistent Year Reprocessing.

Production Rules

PGE05 runs when a full orbit of L2 Aerosol (PGE04) processing has completed. The operations scenario is approximately 15 orbits per day, one activation per orbit. The required input products are granules of MOD04_L2. The Minimum Number of Granules for the required input is set to one granule. After a wait period of 24 hours for all granules in the orbit to be available, PGE05 is executed if there is at least one granule of MOD04_L2.

The Production Rules for PGE05 are:

- Orbit-Based Activation

- Minimum Number of Granules

Data Files

Dynamic Product Input ESDT

MOD04_L2 MODIS/Terra Aerosol 5-Min L2 Swath 10km (R) 1

Dynamic Product Output ESDT

MOD04L_O MODIS/Terra Orbital Aerosol Product 1-Orbit L3
Swath 18km ISIN Grid (A_M) (A_D) 1

Dynamic Runtime Parameter for Operations

Collection Start Time<Start time for data observations>

Collection End Time<End time for data observations>

SatelliteInstrument<Spacecraft platform for MODIS Instrument

supplied by MODAPS. Value = {AM1M,
PM1M}>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL	processed once
REPROCESSINGPLANNED	further update is anticipated
LOCALVERSIONID	<Value of Collection Version; current value = 003>
PGEVERSION	<Version of PGE05 that appears in the ciList delivered with the code>
DAYNIGHTFLAG	Day

4.6. Level 2 Clouds (PGE06)

PGE06 performs the L2 Atmospheric Clouds processing at MODAPS.

Purpose

PGE06 produces the L2 Clouds product (MOD06_L2) and the QC files for Cloud Top Algorithm (MOD6CTQC), Cirrus Detection Algorithm (MOD6CDQC), and Cloud Optical Depth Algorithm (MOD6ODQC, Future).

Structure

PGE06 consists of the L2 cloud processes, Create (MOD_PR06CR), Cloud Top (MOD_PR06CT), Cirrus Detection (MOD_PR06CD), and Cloud Optical Depth (MOD_PR06OD) algorithms. Figure 4-3 shows the structure of PGE06

MODIS V1 Production

PGE06 is run in MODAPS V1 Loader MDA1, which is executed every two hours upon the availability of MOD021KM, MOD03, MOD35_L2, GDAS_0ZF, OZ_DAILY, REYNSST, and SEA_ICE granules covering the processing period. Products archived at MODAPS are 5-minute granules of MOD06_L2 covering the 2-hour processing period. MODAPS exports MOD06_L2 to the PDR Server for archive and distribution at the GSFC DAAC. MODAPS Interim products for the same period are granules of MOD6CTQC, MOD6CDQC, and MOD6ANCT. MOD6ODQC will also be an Interim product in the future.

MODIS V1 Production

PGE06 is run in MODAPS V2 Recipe AM1M_A1, which is executed every two hours upon the availability of MOD021KM, MOD03, MOD35_L2, GDAS_0ZF, OZ_DAILY, REYNSST, and SEA_ICE granules covering the processing period. Products archived at MODAPS are 5-minute granules of MOD06_L2 covering the 2-hour processing period. MODAPS exports MOD06_L2 to the PDR Server for archive and distribution at the GSFC DAAC. MODAPS Interim products for the same period are granules of MOD6CTQC, MOD6CDQC, and MOD6ANCT. MOD6ODQC will also be an Interim product in the future.

Production Rules

PGE06 runs once per five-minute MODIS L1B granule. The operational scenario is nominally 288 activations per day, representing the processing of one granule per PGE execution.

The L2 Clouds product (MOD06_L2) is created by four processes that execute within PGE06. MOD_PR06CR generates the MOD06_L2 product definition file that contains all prescribed data objects in the HDF product specification document, except for ECS metadata. None of the science data arrays, however, are populated at this time. This and insertion of ECS metadata into the file are left for execution of the PE06 science processing algorithms (MOD_PR06CT, MOD_PR06OD and MOD_PR06CD)

Following successful execution of MOD_PR06CR, either MOD_PR06CT or MOD_PR06CD may run next, but not MOD_PR06OD. MOD_PR06OD relies on the cloud top height and temperature data written to the MOD06_L2 product file. The Cloud Top Properties retrieval in MOD_PR06CT is performed on both dark and illuminated scenes. It writes to the Cloud Top Property data arrays during the granule level processing and just prior to termination, transforms the MOD06_L2 product into an archivable file by setting and writing ECS metadata.

Processing in MOD_PR06CD begins with an examination of ECS attribute DAYNIGHTFLAG taken from input ESDT MOD03. If the scene is totally dark (i.e., if DAYNIGHTFLAG='Night'), the process exits immediately, writing a termination message to the ECS LogStatus file, but making no contribution to the output MOD06_L2 file nor generating a "QC" diagnostic output file. For an illuminated or partially illuminated scene (viz., for DAYNIGHTFLAG='Day' or 'Both'), MOD_PR06CD opens the MOD06_L2 template file created by MOD_PR06CR, generates a QC file, and performs data processing on the granule. It writes to the cirrus detection arrays in the MOD06_L2 product, and also writes or updates the ECS metadata (depending on processing order within PGE06).

MOD_PR06OD begins execution by examining the value of the granule level ECS Metadata attribute MinSolarZenithAngle (taken from ESDT MOD35_L2). If the scene is dark (i.e. MinSolarZenithAngle less than 87 degrees), the process exits immediately, writing a termination message to the ECS LogStatus files, but making no contribution to the MOD06_L2 output file. For an illuminated or partially illuminated scene, MOD_PR06OD opens the MOD06_L2 file created by MOD_PR06CR, and does science data processing on the granule. It writes to the MOD06_L2 parameter arrays

specifically reserved for output from cloud optical depth code, and completely rewrites the ECS metadata recorded by predecessor processes within PGE06.

The required MODIS inputs are MOD021KM, MOD03, and MOD35_L2. The required external ancillary data sets are GDAS_0ZF, OZ_DAILY, REYNSST, and SEA_ICE. The NISE external ancillary data set is optional. If the NISE product is not available after all required inputs have arrived, MODAPS may run PGE06 without it. In the future, MODCSR_8 will be an optional input. The required look-up tables and climatological data for PGE06 are contained in the static input files described below.

Using the MODAPS extension of the Advanced Temporal Production Rule, the Production System retrieves the ancillary files that best match the processing period.

- The GDAS_0ZF, OZ_DAILY and SEA_ICE products contain ECS SingleDateTime metadata. MODAPS selects the ancillary data granule whose SingleDateTime is within the search interval (28 days for OZ_DAILY and SEA_ICE) and nearest the MODIS collection period midpoint.
- The REYNSST product contains ECS RangeDateTime metadata. MODAPS selects the ancillary granule whose midpoint (a Wednesday at 12Z GMT) is within the search interval (28 days) and nearest the MODIS collection period midpoint.
- The NISE products contain ECS RangeDateTime metadata. MODAPS selects the ancillary granule whose RangeDateTime overlaps the midpoint of the MODIS output granule collection period.
- In the future DAO data sets, DFLAPMIS, DFLAXCLD, and DFLAXENG may be used as input products. The same production rules are used as for other daily products.

All of the QC products (MOD6CTQC, MOD6CDQC, MOD6ODQC, and MOD6ANCT) are Interim products. MOD6ODQC is a future Interim product.

The Production Rules for PGE06 are:

- Basic Temporal
- Advanced Temporal
- Optional Inputs

Data Files

Static Input ESDT

MOD06LUT

MODIS/Terra Cloud Product LUTs for MOD_PR06CT, MOD_PR06CD, and MOD_PR06OD

MOD35ANC	Olson World Ecosystem Map at 10 minutes resolution and Olson World Ecosystem Map at 1km resolution.
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Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1B Swath 1km (R) 1
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (R) 1
MODCSR_8	MODIS/Terra Clear Sky Radiance Running Statistics 8-Day Global 25km CMG (Future) (O) 1

Dynamic Ancillary Product Input ESDT

GDAS_0ZF	1 Degree NCEP GDAS (R) 1
NISE	Near Realtime SSM/I EASE_Grid Daily Global Ice Concentration and Snow Extent Product (O) 0
OZ_DAILY	TOVS Column Ozone Daily Product (R) 1
REYNSST	Reynolds Weekly SST (R) 1
SEA_ICE	NCEP Ice Concentration at 0.5 Degree Lat/Lon Projection (R) 1
DFLAPMIS	DAO 3-D Gridded (L3) 6 hour synoptic instantaneous fields, pressure level data. (Future versions) (O) 0
DFLAXCLD	DAO 2-D Gridded (L3) 3 hour upstream time averaged fields, cloud related fields, single level data. (Future versions) (O) 0
DFLAXENG	DAO 2-D Gridded (L3) 3 hour upstream time averaged fields, energy related fields, single level data (Future versions) (O) 0

Dynamic Product Output ESDT

MOD06_L2	MODIS/Terra Clouds 5-Min L2 Swath 1km and 5km (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MOD6CTQC	MODIS/Terra MOD_PR06CT QC File for Cloud Top Algorithm 5-Min L2 (I _M) 1
MOD6CDQC	MODIS/Terra MOD_PR06CD QC File for Cirrus Detection Algorithm 5-Min L2 (I _M) 1
MOD6ODQC	MODIS/Terra MOD_PR06OD QC File for Cloud Optical Depth Algorithm 5-Min L2 (I _M) 1
MOD6ANCT	MODIS/Terra Level 2 Cloud Product Temporary File in HDF Format 5-Min L2 (I _M) 1

Temporary Output Files

Two sets of temporary files for each ancillary data sets:

Reformatted GDAS_0ZF for use by MOD_PR06CT and MOD_PR06OD

Reformatted OZ_DAILY for use by MOD_PR06CT and MOD_PR06OD

Reformatted from SEA_ICE for use by MOD_PR06CT and MOD_PR06OD

Dynamic Runtime Parameters for Operations

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL	processed once
REPROCESSINGPLANNED	further update is anticipated
LOCALVERSIONID	<Value of Collection Version; current value = 003>
PGEVERSION	<Version of PGE06 that appears in the ciList delivered with theCode>
ALGORITHMPACKAGEACCEPTANCEDATE	June 1997

ALGORITHMPACKAGEMATURITYCODE	at-launch
ALGORITHMPACKAGENAME	ATBD-MOD-04 and ATBD-MOD-5
ALGORITHMPACKAGEVERSION	2
INSTRUMENTNAME	Moderate Resolution Imaging Spectroradiometer
Algorithm_Version_Cloud_Top_Property_IR	1
Algorithm_Version_Cloud_Phase_IR	1
Algorithm_Version_Cloud_Property_VIS	1
UW DEBUG; 0 to 4	0
Processing Range Begin Line	0
Processing Range Number of Lines	0
Processing Range Begin Element	0
Processing Range Number of Elements	0

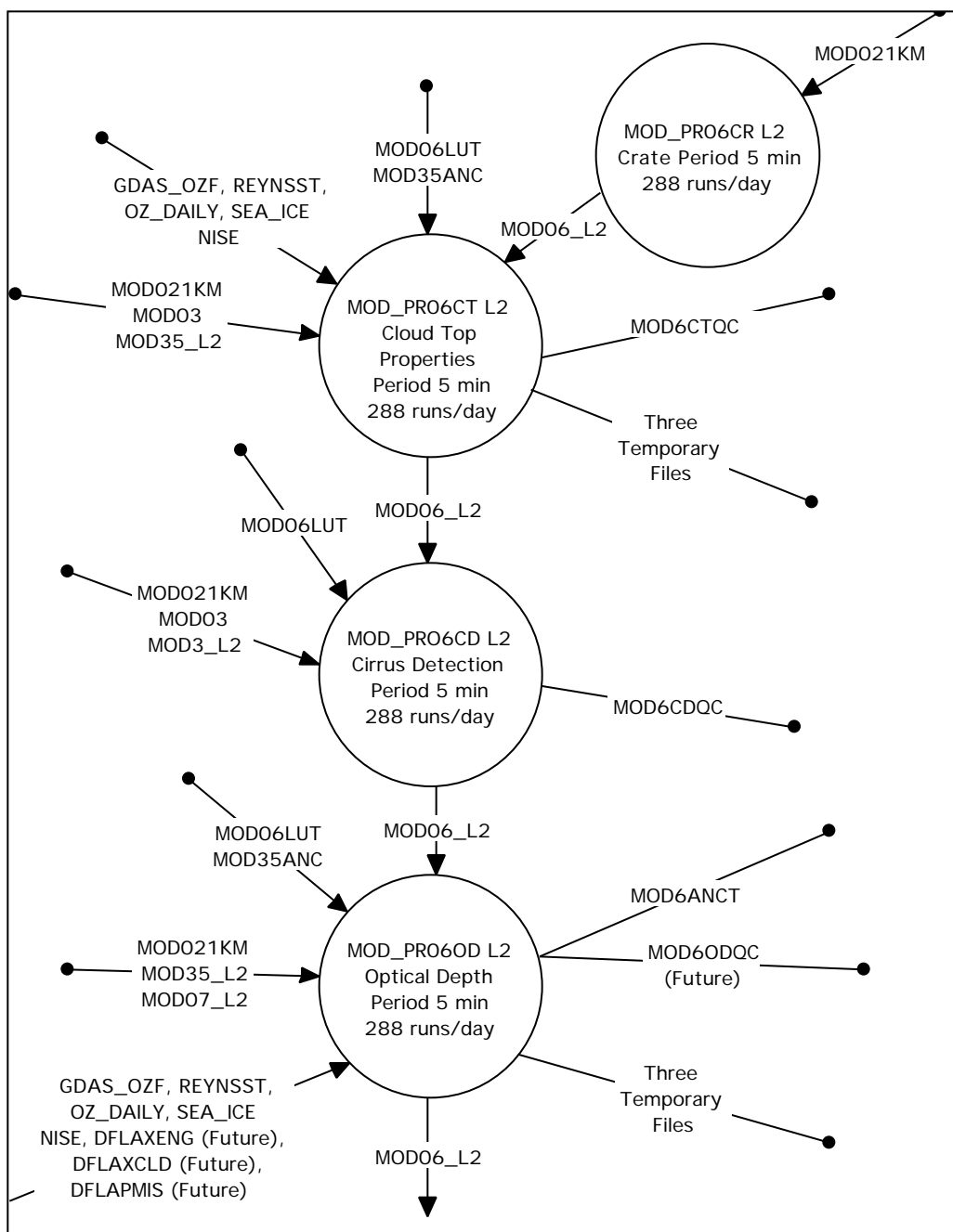


Figure 4-3 PGE06 Structure

4.7. Level 2 Snow Cover (PGE07)

PGE07 is a part of the MODIS Land L2 processing. It produces the L2 Snow Cover product at MODAPS. The L2 Snow Cover data product is generated from MODIS L1B data at spatial resolution of one-half kilometer, data from the Geolocation product (MOD03), and data from the Cloud Mask product (MOD35_L2).

Purpose

PGE07 produces the L2 Snow Cover product (MOD10_L2), which is a day-only Land product, the L2 Snow Cover coarse resolution product (MOD10L2C) and the Land QA product (MODLM_QA).

Structure

PGE07 is comprised of two processing steps: L2 Snow Cover (MOD_PR10) and the Land QA Process (MOD_PRLQA) which will execute immediately after MOD_PR10.

MODAPS V1 Production

PGE07 runs in MODAPS V1 Loader MDL1, which is executed every two hours upon the availability of day mode MOD02HKM, MOD03, and MOD35_L2 granules covering the processing period. Products archived at MODAPS are 5-minute granules of MOD10_L2. There are nominally 12-day mode granules generated in the 2-hour processing period. MODAPS exports MOD10_L2 to the PDR Server for archive and distribution at the NSIDC DAAC. MODAPS Interim products for the same period are MOD10L2C and MODLM_QA, corresponding to the MOD10_L2 5-minute granules.

MODAPS V2 Production

PGE07 runs in MODAPS V2 Recipe AM1M_L1, which is executed every two hours upon the availability of day mode MOD02HKM, MOD03, and MOD35_L2 granules covering the processing period. Products archived at MODAPS are 5-minute granules of MOD10_L2. There are nominally 12-day mode granules generated in the 2-hour processing period. MODAPS exports MOD10_L2 to the PDR Server for archive and distribution at the NSIDC DAAC. MODAPS Interim products for the same period are MOD10L2C and MODLM_QA, corresponding to the MOD10_L2 5-minute granules.

Production Rules

PGE07 runs once for each five minute MODIS L1B granule containing day-mode data. The required inputs are MOD03, MOD02HKM, and MOD35_L2. The operational scenario is nominally 144 activations per day, representing the processing of one day-mode granule per PGE run. A query to the Database for granules with DayNightFlag set to “Day” or “Both” retrieves all MODIS granules containing day-mode data for the 144 daily processing runs.

The current plans of the MODIS Team include processing MODIS data located between 30 to 90 degrees North for the Northern Hemisphere. For the Southern Hemisphere the plans include processing MODIS data located between 60 and 90 degrees South and other limited areas.

The Production Rules for PGE07 are:

- Basic Temporal
- Metadata Based Query

Data Files

Dynamic Product Input ESDT

MOD02HKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 500m (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (R) 1

Dynamic Product Output ESDT

MOD10_L2	MODIS/Terra Snow Cover 5-Min L2 Swath 500m (A _M) (A _D) 1
MOD10L2C	MODIS/Terra Coarse Snow Cover 5-Min L2 Swath 5km (I _M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument <Spacecraft platform for MODIS Instrument
supplied by MODAPS. Value = {AM1M,
PM1M}>

Static Runtime Parameters for Operations

ALGORITHM_PACKAGE_ACCEPTANCE-DATE	<Date of acceptance of current snow cover Algorithm>
ALGORITHM_PACKAGE_MATURITY_CODE	<Specification of maturity of algorithm package as a whole, eg., pre-launch, preliminary, operational, stable, final.>
ALGORITHM_PACKAGE_VERSION	<Snow Cover algorithm version contained in current PGE version>
PGE07 Version	<Version of PGE07 that appears in the ciList delivered with the code>

4.8. Level 2 Sea Ice (PGE08)

PGE08 is the MODIS land L2 Sea Ice process executed at MODAPS. The sea ice extent data product is generated from MODIS L1B data at spatial resolution of 1 km.

Purpose

PGE08 produces the L2 Sea Ice Extent product (MOD29), the L2 Sea Ice Extent coarse resolution product (MOD29L2C), and the Land QA product (MODLM_QA).

Structure

PGE08 consists of the sea ice processing (MOD_PR29) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

PGE08 runs in MODAPS V1 Loader MDL1, which is executed every two hours upon the availability of MOD021KM, MOD03, and MOD35_L2 granules covering the processing period. Products archived at MODAPS are 5-minute granules of MOD29. There are nominally 24 granules generated in the 2-hour processing period. MODAPS exports MOD29 to the PDR Server for archive and distribution at the NSIDC DAAC. MODAPS Interim products for the same period are MOD29L2C and MODLM_QA, corresponding to the MOD29 5-minute granules.

MODAPS V2 Production

PGE08 runs in MODAPS V2 Recipe AM1M_L1, which is executed every two hours upon the availability of MOD021KM, MOD03, and MOD35_L2 granules covering the processing period. Products archived at MODAPS are 5-minute granules of MOD29. There are nominally 24 granules generated in the 2-hour processing period. MODAPS exports MOD29 to the PDR Server for archive and distribution at the NSIDC DAAC. MODAPS Interim products for the same period are MOD29L2C and MODLM_QA, corresponding to the MOD29 5-minute granules.

Production Rules

PGE08 runs once for each set of MODIS MOD03 and MOD021KM 5-minute granules. The required inputs are MOD03, MOD021KM, and MOD35_L2. The operational scenario is nominally 288 activations per day, representing the processing of one granule per PGE run. Three of the SDSs in the sea ice product are available only for input granules with day-mode data. Thus the MOD29 output file sizes for this PGE are variable.

The current plans specify processing MODIS data located between 40 to 90 degrees latitude for the Northern Hemisphere and 50 to 90 degrees for the Southern Hemisphere for every day of the year.

The Production Rules for PGE08 are:

- Basic Temporal
- Metadata Query

Data Files

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250 and 1km (R) 1

Dynamic Product Output ESDT

MOD29	MODIS/Terra Sea Ice Extent 5-Min L2 Swath 1km (A _M) (A _D) 1
MOD29L2C	MODIS/Terra Coarse Sea Ice Extent 5-Min L2 Swath 5km (I _M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
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Static Runtime Parameters for Operations

ALGORITHM_PACKAGE_ACCEPTANCE_DATE	<Date of acceptance of current Sea Ice Extent algorithm.>
ALGORITHM_PACKAGE_MATURITY_CODE	<Specification of maturity of algorithm package as a whole , eg., pre-launch preliminary, operational, stable, final.>
ALGORITHM_PACKAGE_VERSION	Sea Ice Extent algorithm version contained in current PGE version.>
PGE08 Version	<Version of PGE08 that appears in the ciList delivered with the code>

4.9. Level 2 Ocean Color (PGE09)

PGE09 is the first step in the L2 and L3 space-binning Ocean Color processing of the MODIS data executed at MODAPS.

Purpose

PGE09 produces the MODIS Ocean Color (MODOCL2, MODOCL2A, MODOCL2B, MODOCQC) L2 products, L3 space-binned products (MODOCB_{nn}, where nn is 1, 2, ... or 36) and L3 QC products (MODOQB_{qq}, where qq is 51...61 or 63...66).

Structure

PGE09 consists of the Ocean Color L2 process (MOD_PR18) and MODIS Oceans Space Binner process (MOD_PRmsbin). Figure 4-4 shows the structure of PGE09.

MODAPS V1 Production

PGE09 is run in MODAPS V1 Loader MDO1, which is executed every two hours upon the availability of MOD021KM, MOD03, MOD35_L2 (optional), MODOCNMC, MODOCOZN, either MODOCREY or REYNSST, and predicted ephemeris (AM1EPHH) granules covering the processing period. Products archived at MODAPS are MODOCL2, MODOCL2A, MODOCL2B, MODOCB_{nn} (where nn = parameters 1-36), MODOQB_{qq} (where qq = parameters 51...61, 63...66), and MODOCQC. PGE09 produces a maximum of 2 granules for 2 data days of MODOCB_{nn} for each of its 36 parameters and 2 granules for 2 data days of MODOQB_{qq} for each of its 15 parameters. MODAPS exports MODOCL2, MODOCL2A, MODOCL2B, and MODOCQC to the PDR Server for archive and distribution at the GSFC DAAC. MODAPS Interim products for the same period are granules of MODOCB_{nn} and MODOQB_{qq}.

MODAPS V2 Production

PGE09 is run in MODAPS V2 Recipe AM1M_01, which is executed every two hours upon the availability of MOD021KM, MOD03, MOD35_L2 (optional), MODOCNMC, MODOCOZN, either MODOCREY or REYNSST, and predicted ephemeris (AM1EPHH) granules covering the processing period. Products archived at MODAPS are MODOCL2, MODOCL2A, MODOCL2B, MODOCB_{nn} (where nn = parameters 1-36), MODOQB_{qq} (where qq = parameters 51...61, 63...66), and MODOCQC. PGE09 produces a maximum of 2 granules for 2 data days of MODOCB_{nn} for each of its 36 parameters and 2 granules for 2 data days of MODOQB_{qq} for each of its 15

parameters. MODAPS exports MODOCL2, MODOCL2A, MODOCL2B, and MODOCQC to the PDR Server for archive and distribution at the GSFC DAAC. MODAPS Interim products for the same period are granules of MODOCB_{nn} and MODOQB_{qq}.

Production Rules

PGE09 runs once for each input 5-minute MODIS L1B day-mode and mixed-mode granule to generate products for one of the output parameters. The required inputs are MOD021KM and MOD03. MOD35_L2 is an optional input. PGE09 is also dependent upon ancillary files that must be available and pre-processed through the Oceans Ancillary Meteorological Preprocess (PGE17), the Oceans Ancillary Reynolds SST Preprocess (PGE18) in future versions, and the Oceans Ancillary Ozone Preprocess (PGE19) before processing begins for PGE09. MODOCNMC is produced in six-hour granules from the 1 degree NCEP GDAS data by PGE17. These ancillary data must be staged for the time covering \pm six hours of the current MODIS granule being processed. Thus, three files are staged. A weekly MODOCREY will be produced from the Reynolds SST data by PGE18 in the future. In order to produce MODIS Oceans L2 products in the same time frame as other MODIS L2 products that do not use the weekly Reynolds SST file, the previous weekly file is staged rather than waiting for the current weekly file. If the file from the previous week is not available, then the next file back in time is staged. Thus the nearest available Reynolds SST weekly file is staged. MODOCOZN is produced in daily granules from the TOMS Column Ozone (Earth Probe) data by PGE19. These ancillary data must be staged for the time covering the current MODIS granule being processed the previous day, and the following day. Thus, three files are required. The Advanced Temporal Production Rule is required to set negative deltas to the start of the processing period and positive deltas to the end of the processing period to acquire all of the ancillary data files needed.

PGE09 also requires the three previous, the current, and the next three days of orbital (ephemeris) files for data day calculations. MODAPS actually stages seven days of predicted Terra AM1EPHH or Aqua PM1EPHH, from PGE 76, with day 4 overlapping the current 2-hour processing period. PGE76 generates the following predicted ephemeris files for the current day's processing:

- AM1EPHH or PM1EPHH corresponding to the current day;
- AM1EPHH1 or PM1EPHH1 for subsequent day 1;
- AM1EPHH2 or PM1EPHH2 for subsequent day 2;
- AM1EPHH3 or PM1EPHH3 for subsequent day 3,

For a current run of PGE09, MODAPS V2 stages the above four files and three previous days of AM1EPHH or PM1EPHH. The following day, PGE76 writes a new set of current and predicted ephemeris files as above. MODAPS V2 then stages the new current day AM1EPHH or PM1EPHH, three previous days of the same ESDT, and the new "H1", "H2", and "H3" files.

The Space Binner Process (MOD_PRmsbin) requires the orbit files for 6 hours of time starting before and 6 hours beyond the current processing period to calculate the boundaries between the Ocean Data Days. MOD_PRmsbin writes the start dataday and end dataday PSAs into the output products. This process also sets several related metadata attributes. It sets the PSA AscendingDescendingFlg to "descending" for day mode data and "ascending" for night mode data and sets the DayNightFlag to "Day" for descending orbit and "Night" for ascending orbit. The only night mode data staged for PGE09 are input granules with DayNightFlag set to "Both."

PGE09 produces the first ocean color products (MODOCL2, MODOCL2A, MODOCL2B) in 5-minute granules and the first products of 36 space-binned ocean color parameters (MODOCB_{nn}) and 15 space binned ocean color QC parameters (MODOQB_{qq}) in 5-minute granules. Because the input 5-minute MODIS granules may span several Ocean Data Days, two output space-binned 5-minute granules of MODOCB_{nn} and MODOQB_{qq} maybe produced for each ocean parameter. Since the overlap may be before or after the current Data Day being processed, 3 spaces in the PCF are reserved for possible output files of these space-binned products. MODOQB and MODOCB are produced only for granules with descending node scans. PGE09 also produces the quality control file (MODOCQC).

Since only day-mode granules are to be processed, a Metadata Based Query will be made on the MOD021KM and other input products for granules with the DayNightFlag equal to "Day" or "Both." The operational scenario is nominally 144 activations per day, representing the processing of one day-mode granule per PGE execution.

The Production Rules for PGE09 are:

- Basic Temporal
- Advanced Temporal
- Metadata Based Query
- Nearest Temporal Match
-
-

Data Files**Static Input ESDT**

MODOCAER	MODIS/Terra Ocean Color Aerosol Coefficients
MODOCBIN	MODIS/Terra Ocean Space Binning Parameters
MODOCLUT	MODIS/Terra Ocean Color Generic Input Files
MODOCRAY	MODIS/Terra Ocean Color Rayleigh Coefficients
MODSEACL	MODIS/Terra Ocean Color SeaWifs Calibration Coefficients

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (O) 0
MODOCNMC	NMC ancillary data for MODIS Oceans processing (Preprocessed 1 Degree NCEP GDAS (GDAS_0ZF), National Meteorological Center (NMC) Ancillary data for MODIS Oceans Processing; Converted from GRIB to HDF-EOS Format) (R) 3
MODOCOZN	Toms ozone data for MODIS Oceans processing (Preprocessed TOMS Column Ozone (Earth Probe) (OZONEEP) Ancillary data for MODIS Oceans Processing; Converted from ASCII to HDF-EOS Format) (R) 3
MODOCREY	Reynolds Sea Surface Temperature data for MODIS Oceans processing (Preprocessed Reynolds Sea Surface Temperature Ancillary data for MODIS Oceans Processing, converted from ASCII to HDF_EOS Format (previous week; future versions)) (R) 1

Dynamic Ancillary Product Input

AM1EPHH	MODIS/Terra Current Day Predicted Ephemeris Daily (Spacecraft ephemeris/orbit data files to be read via SDP Toolkit. PGE09 will use 24-hour predicted ephemeris files generated from an actual AM1EPHN0 file; AM1EPHH is a MODAPS specific ESDT.) (R) 7
PM1IPHH	MODIS/Aqua Current Day Predicted Ephemeris Daily (Spacecraft ephemeris/orbit data files to be read via SDP Toolkit. PGE09 will use 24-hour predicted ephemeris files generated from an actual PM1EPHND file; PM1EPHH is a MODAPS specific ESDT.) (R) 7
leapsec.dat	Data file used by the SDP Toolkit that relates leap second (TAI-UTC) values to UTC Julian dates
utcpole.dat	Data file used by the SDP Toolkit that relates UT1-UTC values to UTC dates
REYNSST	Reynolds Weekly SST (Previous week; will be replaced by MODOCREY in future versions) (R) 1

Dynamic Product Output ESDT

MODOCL2	MODIS/Terra Ocean Color Radiance Products 5-Min L2 Swath 1km Day (A _M) (A _D) 1
MODOCL2A	MODIS/Terra Ocean Color Derived Products Group 1 5-Min L2 Swath 1km Day (A _M) (A _D) 1
MODOCL2B	MODIS/Terra Ocean Color Derived Products Group 2 5-Min L2 Swath 1km Day (A _M) (A _D) 1
MODOCB _{nn}	MODIS/Terra Ocean Color Space-Binned Composite Params 1-36 5-Min L3 Global 1km ISEAG (where nn = parameters 1-36) (A _M) 2*

MODOQB_{qq} MODIS/Terra Ocean Color Space-Binned Composite
 QC Products 5-Min L3 Global 1km ISEAG (where qq
 = parameters 51-61, 63-66) (A_M) 2*

*per parameter

Quality Control Output ESDT

MODOCQC MODIS/Terra Ocean Color QC Products 5-Min L2
 Swath 1km Day (A_M) (A_D) 1

Dynamic Runtime Parameters for Operations

SatelliteInstrument <Spacecraft platform for MODIS Instrument
 supplied by MODAPS. Value = {AM1M,
 PM1M}>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	0
subsamplex	0
subsampley	0
PGEVersion	<Version of PGE09 that appears in the CiList delivered with the code>

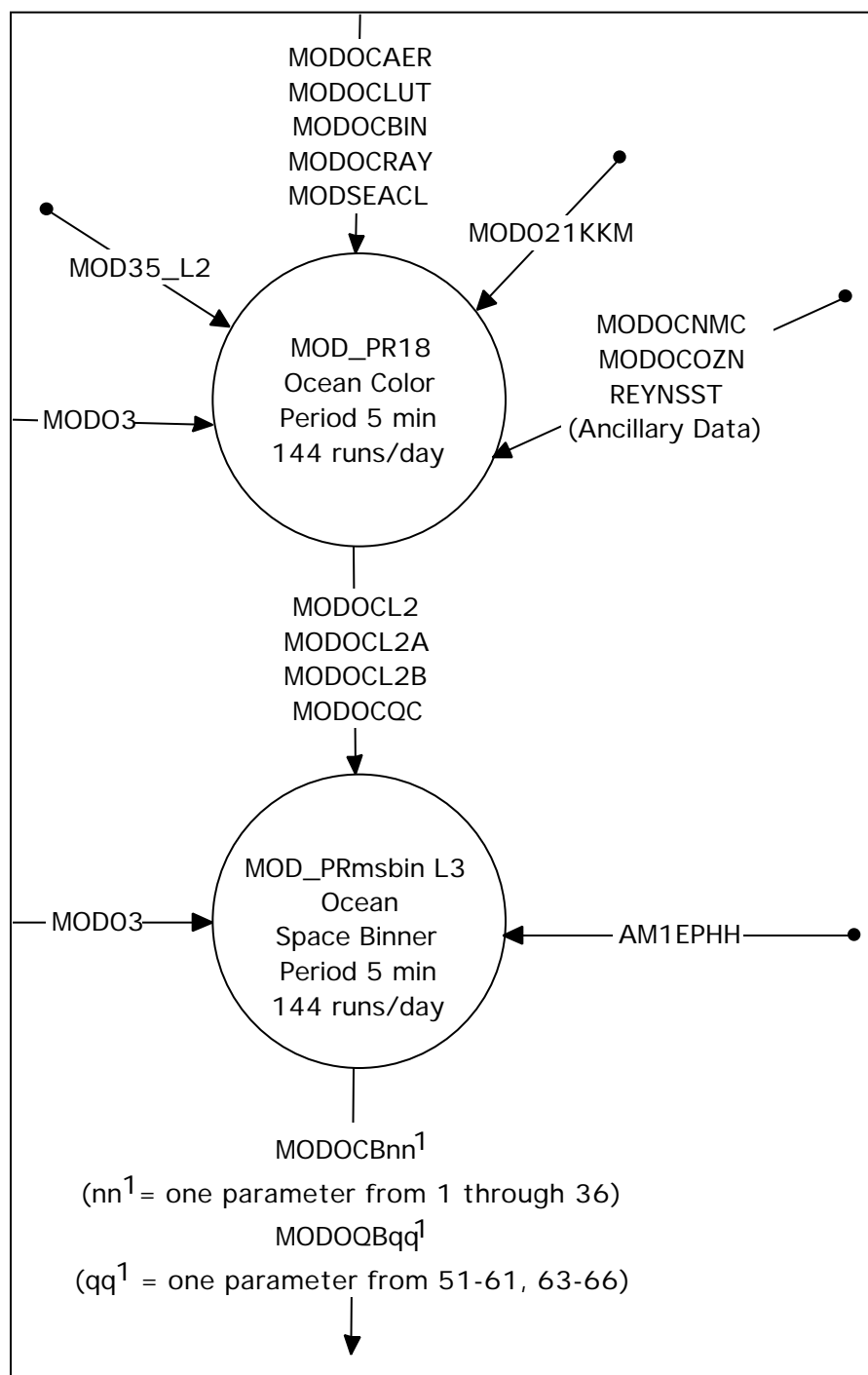


Figure 4-4 PGE09 Structure

4.10. Level 2 Sea Surface Temperature (PGE10)

PGE10 consists of the Oceans L2 and L3 Space-binning Sea Surface Temperature (SST) processing executed at MODAPS.

Purpose

PGE10 produces the SST L2 products (MOD28L2, MOD28QC), L3 space-binned products (MOD28B_{mm}, where mm is D1, D2, N1, or N2), and L3 QC products (MODSQB_{rr}, where rr is D1...D9, DA, N1...N9, or NA).

Structure

PGE10 consists of the Sea Surface Temperature L2 process (MOD_PR28) and Oceans Space Binner process (MOD_PRmsbin). Figure 4-5 shows the structure of PGE10.

MODAPS V1 Production

PGE10 is run in MODAPS V1 Loader MDO1, which is executed every two hours upon the availability of MOD021KM, MOD03, MOD35_L2, MODOCREY or REYNSST, and predicted attitude (AM1EPHH) granules covering the processing period. Products archived at MODAPS are MOD28L2, MOD28B_{mm} (where mm=parameters D1, D2, N1, N2), MODSQB_{rr} (where rr=parameters D1-D9, DA, N1-N9, NA) and MOD28QC. PGE10 produces a maximum of 2 granules of MOD28B_{nn} for each of its 4 parameters and 2 granules of MODSQB_{rr} for each of its 20 parameters. MODAPS exports MOD28L2 and MOD28QC to the PDR Server for archive and distribution at the GSFC DAAC. MODAPS Interim products for the same period are granules of MOD28B_{mm} and MODSQB_{rr}.

MODAPS V2 Production

PGE10 is run in MODAPS V2 Recipe AM1M_01, which is executed every two hours upon the availability of MOD021KM, MOD03, MOD35_L2, MODOCNMC, MODOCOZN and either MODOCREY or REYNSST, and predicted attitude (AM1EPHH) granules covering the processing period. Products archived at MODAPS are MOD28L2, MOD28B_{mm} (where mm=parameters D1, D2, N1, N2), MODSQB_{rr} (where rr=parameters D1-D9, DA, N1-N9, NA) and MOD28QC. PGE10 produces a maximum of 2 granules of MOD28B_{nn} for each of its 4 parameters and 2 granules of MODSQB_{rr} for each of its 20 parameters. MODAPS exports MOD28L2 and MOD28QC to the PDR

Server for archive and distribution at the GSFC DAAC. MODAPS Interim products for the same period are granules of MOD28B_{mm} and MODSQB_{rr..}

Production Rules

PGE10 runs once for each 5-minute MODIS L1B granule to generate products for one of the output parameters. The required inputs are MOD021KM and MOD03. MOD35_L2 is an optional input. PGE10 is also dependent upon ancillary files that must be available and pre-processed through the Oceans Ancillary Meteorological Preprocess (PGE17), the Oceans Ancillary Ozone Preprocess (PGE19) before processing begins for PGE10. PGE10 is also dependent upon the weekly REYNSST ancillary files that must be available before processing begins. In future versions the REYNSST will be pre-processed through the Oceans Ancillary Reynolds SST Preprocess (PGE18). In order to produce MODIS Oceans L2 products the same time frame as other MODIS L2 products that do not use the weekly Reynolds SST file, the previous weekly file is staged rather than wait for the current weekly file. If the file from the previous week is not available, then the next file back in time is staged. Thus the nearest available Reynolds SST weekly file is staged.

PGE10 also requires the three previous, the current, and the next three days of orbital ephemeris files for data day calculations. MODAPS actually stages seven days of predicted AM1EPHH from PGE76, with day 4 overlapping the current 2-hour processing period. PGE76 generates the following predicted ephemeris files for the current day's processing:

- AM1EPHH or PM1EPHH corresponding to the current day;
- AM1EPHH1 or PM1EPHH1 for subsequent day 1;
- AM1EPHH2 or PM1EPHH2 for subsequent day 2;
- AM1EPHH3 or PM1EPHH3 for subsequent day 3,

For a current run of PGE10, MODAPS V2 stages the above four files and three previous days of AM1EPHH or PM1EPHH. The following day, PGE76 writes a new set of current and predicted ephemeris files as above. MODAPS V2 then stages the new current day AM1EPHH or PM1EPHH, three previous days of the same ESDT, and the new "H1", "H2", and "H3" files.

The Space Binner process (MOD_PRmsbin) requires the orbit files for a period of 20 hours before and 6 hours beyond the current processing period to calculate the boundaries between the Ocean Data Days. MOD_PRmsbin process writes the start dataday and end dataday PSAs into the output products. This process also sets

several related metadata attributes. It sets the PSA AscendingDescendingFlg to “descending” for day mode data and “ascending” for night mode data and sets the DayNightFlag to “Day” for descending orbit and “Night” for ascending orbit.

The orbit data are required inputs. The Advanced Temporal Production Rule is also required for the previous and next days of orbit data. Deltas for the beginning and end of these files are set using the same algorithm as for instrument science data.

PGE10 produces the first ocean Sea Surface Temperature products (MOD28L2) in 5-minute granules and the first products of two space-binned Sea Surface Temperature parameters for day and night mode granules (MOD28B_{D1}, MOD28B_{D2}, MOD28B_{N1}, MOD28B_{N2}) in 5-minute granules. It also produces space-binned Sea Surface Temperature QC parameters (MODSQB_{rr}) for day and night mode in 5-minute granules. Because the input 5-minute MODIS granules may span several Ocean Data Days, two space-binned, 5-minute granules of MOD28B_{mm} and MODSQB_{rr} maybe produced for each ocean parameter. Since the overlap may be before or after the current Data Day being processed, 3 spaces in the PCF are reserved for possible output files of these space-binned products. PGE10 also produces the quality control file (MOD28QC). The operational scenario is nominally 288 activations per day, representing the processing of one 5-minute granule per PGE execution.

The Production Rules for PGE10 are:

- Basic Temporal
- Advanced Temporal
- Nearest Temporal Match

Data Files

Static Input ESDT

MOD28LUT	MODIS/Terra SST Generic Input Files
MOD28PAR	MODIS/Terra SST Parameters
MODOCBIN	MODIS/Terra Ocean Space Binning Parameters

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
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MODOCNMC	NMC ancillary data for MODIS Oceans processing (Preprocessed 1 Degree NCEP GDAS (GDAS_0ZF), National Meteorological Center (NMC) Ancillary data for MODIS Oceans Processing; Converted from GRIB to HDF-EOS Format) (R) 3
MODOCOZN	Toms ozone data for MODIS Oceans processing (Preprocessed TOMS Column Ozone (Earth Probe) (OZONEEP) Ancillary data for MODIS Oceans Processing; Converted from ASCII to HDF-EOS Format) (R) 3
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath (R) 1
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (O) 1
MODOCREY	Reynolds Sea Surface Temperature data for MODIS Oceans processing (Preprocessed Reynolds Sea Surface Temperature Ancillary data for MODIS Oceans Processing, converted from ASCII to HDF_EOS Format (previous week; future versions)) (R) 1

Dynamic Ancillary Product Input

REYNSST	Reynolds Weekly SST (R) 1
AM1EPHH	Spacecraft ephemeris/orbit data files to be read via SDP Toolkit (PGE10 will use 24-hour predicted ephemeris files) (R) 7
leapsec.dat	Data file used by the SDP Toolkit that relates leap second (TAI-UTC) values to UTC Julian dates
utcpole.dat	Data file used by the SDP Toolkit that relates UT1-UTC values to UTC dates

Dynamic Product Output ESDT

MOD28L2	MODIS/Terra Sea Surface Temperature Products 5-Min L2 Swath 1km (A _M) (A _D) 1
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MOD28B _{mm}	MODIS/Terra Sea Surface Temperature Space-Binned Composite Params 1-4 5-Min L3 Global 1km ISEAG (where mm = parameters D1, D2, N1, N2) (A _M) 2*
MODSQB _{rr}	MODIS/Terra Sea Surface Temperature Space-Binned Composite QC Products 5-Min L3 Global 1km ISEAG (where rr = parameters D1-D9, DA, N1-N9, NA) (A _M) 2*

*per parameter

Quality Control or Diagnostic Output ESDT

MOD28QC	MODIS/Terra Sea Surface Temperature QC Products 5-Min L2 Swath 1km (A _M) (A _D) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
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Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	0
subsamplex	0
subsampley	0
PGEVersion	<Version of PGE10 that appears in The ciList delivered with the code>

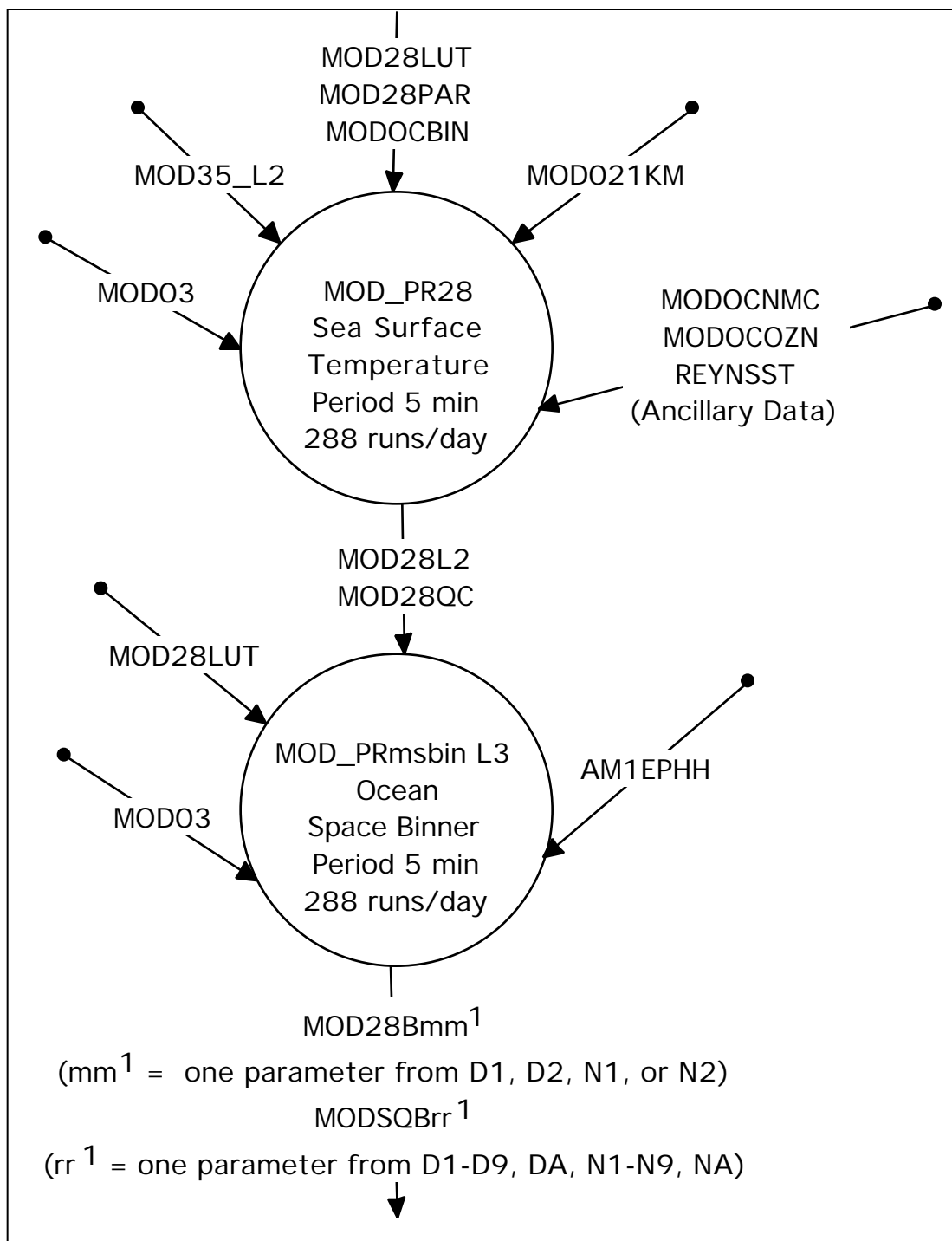


Figure 4-5 PGE10 Structure

4.11. Level 2 Land Surface Reflectance (PGE11)

PGE11 performs processing for L2 Land Surface Reflectance at MODAPS.

Purpose

PGE11 produces Land L2 products, namely L2 Surface Reflectance (MOD09) and coarse resolution Surface Reflectance (MOD09CRS). It also produces the Land QA product (MODLM_QA), the L1B averaged coarse resolution product (MOD02CRS), and the L1B subsampled coarse resolution product (MOD02CSS).

Structure

PGE11 consists of three processes: MOD_PR09, MOD_PR02CRS, and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

PGE11 runs in MODAPS V1 Loader MDL3, which is executed once every orbit upon the availability of one or more of the L1B products (MOD021KM, MOD02HKM, and MOD02QKM) for the orbital period. Products archived at MODAPS are a set of 24 granules of each of the following data types covering the orbital period: MOD09 and MOD14. MODAPS exports MOD14 to the PDR Server for archive and distribution at the EDC DAAC. MODAPS Interim products for the same period are 24 granules of MOD09, 24 granules of MOD09CRS, 24 granules of MOD02CRS, and 48 granules of MODLM_QA. When MODIS processing changed from MODAPS V1 to MODAPS V2 to do the Consistent Year Reprocessing, the production of MOD14 was moved to another PGE.

MODAPS V2 Production

PGE11 runs in MODAPS V2 Recipe AM1M_L3, which is executed once every orbit upon the availability of one or more of the L1B products (MOD021KM, MOD02HKM, and MOD02QKM) for the orbital period. Products archived at MODAPS are a set of 24 granules of MOD09 covering the orbital period. MODAPS Interim products for the same period are 24 granules of MOD09CRS, 24 granules of MOD02CRS, 24 granules of MOD02CSS, and 24 granules of MODLM_QA.

Production Rules

PGE11 runs once for each orbit of MODIS data granules. The required input is at least one of the data sets MOD021KM, MOD02HKM, and MOD02QKM. MOD35_L2 and MOD03 are optional inputs. For every temporally-matched set of day-mode input granules, PGE11 will output one granule of MOD09 and one granule of MOD09CRS. After a time-out period for the required input MOD02 at any resolution to become available at MODAPS, PGE11 will run using the available granules for the orbit, with a minimum of one granule of each type. The wait time for running PGE11 is to be set initially to 72 hours.

The ancillary data sets which are used in standard production are GDAS_0ZF and OZ_DAILY. DFLAXCHM, DFLAXENG, and DFLAXMIS will be used in the future. Using the Advanced Temporal Production Rule, delta times are specified to the start and end of the processing period to retrieve the ancillary files that best match the orbital period. The algorithms for setting the delta times in the start and end of the data processing period for these ancillary data sets are described in Section 5.8, Advanced Temporal Production Rule. The code has static climatology data files and internal models as backups if the dynamic ancillary data are not available when the processing begins.

PGE11 has two dynamic runtime parameters: start date time and end date time.

The Production Rules for PGE11 are:

- Orbit-Based Activation
- Advanced Temporal
- Optional Inputs
- Minimum Number of Granules
- Runtime Parameters

Data Files

Static Input ESDT

MOD09LU1	MODIS/Terra Aerosol Transmittance LUTs for Production of MOD09
MOD09LU2	MODIS/Terra Concentration LUTs for Production of MOD09
MOD09LU3	MODIS/Terra Various LUTs for Production of MOD09

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (O) 0
MOD02HKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 500m (O) 0
MOD02QKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250m (O) 0

(One of the above must be available)

MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath (O) 0
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (O) 0
MOD04L_O	MODIS/Terra Orbital Aerosol Product 1-Orbit L3 Swath 18km ISIN Grid (MODAPS V1 only) (O) 0

Dynamic Ancillary Product Input ESDT

GDAS_OZF	1 Degree NCEP GDAS (O) 0
OZ_DAILY	TOVS Column Qzone Daily Product (O) 0
DFLAXCHM	DAO 2-D Gridded (L3) 3 hour upstream time averaged fields, chemical related fields, single level data (future versions) (O) 0 PGE11 uses variable OZONE, total ozone (ppmv).
DFLAXENG	DAO 2-D Gridded (L3) 3 hour upstream time averaged fields, energy related fields, single level data. (future versions) (O) 0 PGE11 uses variable TPW, total precipitable water (g/cm ²).
DFLAXMIS	DAO 2-D Gridded (L3) instantaneous fields at synoptic times, miscellaneous fields, single level data. (future versions) (O) 0 PGE11 uses variable PS, surface pressure (hPa) for testing only.

Dynamic Product Output ESDT

MOD09	MODIS/Terra Surface Reflectance 5-Min L2 Swath 250m, 500m and 1km (A _M)	24
MOD09CRS	MODIS/Terra Coarse Surface Reflectance 5-Min L2 Swath 5km (I _M)	24
MOD14	MODIS/Terra Thermal Anomalies/Fire 5-Min L2 Swath 1km (MODAPS V1 only) (A _M) (A _D)	24
MOD02CRS	MODIS/Terra Coarse Calibrated Radiances 5-Min L2 Swath 5km (I _M)	24
MOD02CSS	MODIS/Terra Subsampled Coarse Calibrated Radiances 5-Min L2 Swath 5km (I _M)	24

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M)	24
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Dynamic Runtime Parameters for Operations

Start date time	<Start time for data observations>
End date time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

adja_on: 1=enable 0=disable	0
brdf_mode; 0=none 1=Montana 2=Boston	0
lam_cor; 0=disable 1= enable	1
REPROCESSINGACTUAL metadata field	processed once
REPROCESSINGPLANNED metadata field	further update is anticipated
product version number	<Value of collection Version; current value = (on LUN 209702)>
product version number	<value of collection version; current value = (on LUN 209704)>
process 250m data band 1; 1=yes, 0 = no	1
process 250m data band 2; 1=yes, 0=no	1

process 500m data band 1; 1=yes, 0 = no	0
process 500m data band 2; 1=yes, 0 = no	0
process 500m data band 3; 1=yes, 0 = no	1
process 500m data band 4; 1=yes, 0 = no	1
process 500m data band 5; 1=yes, 0 = no	1
process 500m data band 6; 1=yes, 0 = no	1
process 500m data band 7; 1=yes, 0= no	1
process 1km data band 1; 1=yes, 0 = no	1
process 1km data band 2; 1=yes, 0 = no	1
process 1km data band 3; 1=yes, 0 = no	1
process 1km data band 4; 1=yes, 0 = no	1
process 1km data band 5; 1=yes, 0 = no	1
process 1km data band 6; 1=yes, 1 = no	1
process 1km data band 7: 1=yes, 0 = no	1
produce coarse resolution 11b by average; 1 = yes, 0 = no	1
produce coarse resolution 11b by subsample; 1 = yes, 0 = no	1
produce coarse resolution product; 1=yes, 0=no	1
produce fire product; 1=yes, 0=no	1
process sea pixels; 1=yes, 0=no	1
scans to process; -1 = process all scans	-1
force internal cloud mask for reflectance 1=yes 0=no	0
force internal cloud mask for fire 1=yes 0=no	0
use MODIS AOT 0=no 1=yes	1
PGE11 Version	<Version of PGE11 that appears in the ciList delivered with the code>

Special Error PGE Processing

On errors, the entire orbit's worth of data does not need to be run. For every sequence of granules that are produced in error, the above production rules should be followed with the following exceptions:

- The MOD14 product may be produced without the MOD09 products by setting the following RUNTIME PARAMETERS equal to 0; 209900, 209901, 209904, 209905, 209906, 209907, 209908.
- The MOD09 product may be produced without the MOD14 product by setting the following RUNTIME PARAMETER equal to 0; 209917.
- Production of the MOD09CRS product may be disabled by setting the following RUNTIME PARAMETER equal to 0: 209916.
- When reproducing PGE runs that do not contain the MOD14 output product, only input L1 and L2 granules that temporally correspond to the granules in question must be staged as input.

- When reproducing PGE runs that include the MOD14 output product, the following rules must be followed:
 - Only L1 and L2 MODIS input granules that correspond temporally between and including the granule prior to the first granule in question and the granule immediately following the last granule in question must be staged as input.
 - After the production run, the first MOD09, MOD14, and MOD09CRS granules produced in the temporal sequence and the last MOD09, MOD14, MOD09CRS granules produced in the temporal sequence should be given a disposition of interim files with a life of 0 seconds. These MOD09C granules should not be sent to the Principle Investigator's SCF.

Exception: If a granule in question is the first or last granule in an orbit, it should be used as the start/end granule of the production run and should be given its normal production run disposition.

4.12. Level 2G Pointers (PGE12)

PGE12 supports the L2G land processing at MODAPS by creating the pointer maps from granules to Land tiles and the associated geolocation angles..

Purpose

PGE12 produces some of the files required for L2G land processing, namely the L2G pointer maps in the Integerized Sinusoidal projection at three resolutions: 1km (MODPT1KD, MODPT1KN), 500m (MODPTHKM), and 250m (MODPTQKM) and the L2G pointer maps in the EASE-Grid polar projection at 1 km resolution (MODPTPGD and MODPTPGN), at 500m resolution (MODPTPHD), and at 250m resolution (MODPTPQD).

It also produces the tiled geolocation angular data (MODMGGAD, MODMGGAN) in Integerized Sinusoidal projection, tiled geolocation angular data (MODMGPGD, MODMGPGN) in EASE-Grid polar projection, and the Land QA product (MODLM_QA). The 1 km pointers and geolocation angles are produced in day and night mode.

Structure

PGE12 consists of the L2G pointer map process (MOD_PRMGPNTR) which produces the pointers at three resolutions, the tiled geolocation angular data process (MOD_PRMGR) which produces the L2G Geolocation Angles, and the Land QA process (MOD_PRLQA). Figure 4-6 shows the structure of PGE12.

MODAPS V1 Production

PGE12 runs in MODAPS V1 Loader MDL5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. Currently MODAPS runs four PGE profiles to produce combinations of day and night mode daily L2G products, combinations of 500m and 1km resolutions, and two grid schemes. The profiles are shown below.

Products archived at MODAPS are the daily L2G granules of MODMGGAD, MODMGGAN, MODPT1KD, MODPT1KN, MODPTHKM, MODPTQKM, MODMGPGD, MODMGPGN, MODPTPGD, MODPTPGN, MODPTPHD, and MODPTPQD. The corresponding Interim products at MODAPS are MODLM_QA files for each of the pointer and geoangle granules. MODAPS exports MODMGGAD, MODMGGAN, and 24 of each type of pointer MODPT1KD, MODPT1KN, MODPTHKM and MODPTQKM granules, selected by the tile identification, to the PDR Server for archive and

distribution at the EDC DAAC. The EASE-Grid pointers and geolocation angles are not exported to any of the DAACs.

MODAPS V2 Production

PGE12 runs in MODAPS V2 Recipe AM1M_L5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. Currently MODAPS runs four PGE profiles to produce combinations of day and night mode daily L2G products, combinations of 500m and 1km resolutions, and two grid schemes. The profiles are shown below.

Products archived at MODAPS are the daily L2G granules of MODMGGAD, MODMGGAN, MODPT1KD, MODPT1KN, MODPTHKM, MODPTQKM, MODMGPGD, MODMGPGN, MODPTPGD, MODPTPGN, MODPTPHD, and MODPTPQD. The corresponding Interim products at MODAPS are MODLM_QA files for each of the pointer and geoangle granules. MODAPS exports MODMGGAD, MODMGGAN, and 24 of each type of pointer MODPT1KD, MODPT1KN, MODPTHKM and MODPTQKM granules, selected by the tile identification, to the PDR Server for archive and distribution at the EDC DAAC. The EASE-Grid pointers and geolocation angles are not exported to any of the DAACs.

Production Rules

After a full day of PGE01 processing has completed, each PGE12 profile runs once per Land tile per day for MOD03 geolocation granules associated with Land surface reflectance, fire, and snow in day mode in Integerized Sinusoidal projection; once per tile for sea ice data in day mode in EASE-Grid polar projection; once per tile for fire in night mode in Integerized Sinusoidal projection; and once per tile for sea ice data in night mode in EASE-Grid projection. Thus, PGE12 requires four primary profiles to make day mode and night mode sets of pointers for each resolution and sets of geolocation angles for day mode and night mode. For MODIS Version 3.0 SDPS running under MODAPS V2, seven tile schemes in the Integerized Sinusoidal Projection and EASE-Grid Polar Projection have been defined and registered in MODAPS. These tile schemes are listed in Table 4-2 with the MODIS Land PGE profiles that use them.

The four profiles with output products are the following:

Profile 1	Day Mode	Integerized Sinusoidal	MODMGGAD
		Grid	MODPT1KD

			MODPTHKM
			MODPTQKM
			MODLM_QA
Profile 2	Day Mode	EASE-Grid	MODMGPGD
			MODPTPHD
			MODPTPQD
			MODPTPGD
			MODLM_QA
•	Profile 3	Night Mode	Integerized Sinusoidal
			Grid
•			MODMGGAN
			MODPT1KN
			MODLM_QA
Profile 4	Night Mode	EASE-Grid	MODMGPGN
			MODPTPGN
			MODLM_QA

PGE12 requires the Latitude/Longitude Tiling Production Rule. To execute PGE12, a Latitude/Longitude tile definition file must be associated with the PGE. For each individual execution, MODAPS will create a recipe instance with a particular Tile ID and pass the Tile ID back to the PGE as a Runtime Parameter.

The activation of any profile of PGE12 is dependent on the availability of at least one granule of the required MOD03 geolocation in the associated day and night modes for the processing day. MOD03 is a required input. The average number of MOD03 granules is 4.5, but the number may vary from 1 to 28. The number of granules overlapping a particular tile for a daily PGE run may be as few as one or even zero. If there are zero granules, the PGE is not run for that tile. For all PGEs requiring the Latitude/Longitude Tiling Production Rule, the Minimum Number of Granules will be set to a default of one.

Day and night modes are run separately. In the day mode production scenarios, PGE12 day mode profiles will be run for tiles in the Integerized Sinusoidal tile schemes shown in Table 4-2, Land L2G PGE Profiles and Tile Schemes. To execute one of these profiles of PGE12, the tile scheme must already be associated with the PGE profile. To stage the correct day mode input, a Metadata Based Query Production Rule is used on

the geolocation (MOD03) granules' metadata attribute DayNightFlag with values of either "Day" or "Both."

In the night mode production scenarios, PGE12 night mode profiles will be run for all tiles in schemes shown in Table 4-2. To execute one of these profiles of PGE12, the tile scheme must already be associated with the PGE profile at registration. To stage the correct night mode input, a Metadata Based Query Production Rule is used on the geolocation (MOD03) granules' metadata attribute DayNightFlag with a value of "Night."

The maximum number of Land tiles over the surface of the Earth defined in the Integerized Sinusoidal projection is 384. Of these 338 are land and 130 are sea-ice.

The operational scenarios for all profiles of PGE12 are a maximum of 338 land and 130 sea ice activations for day mode and night mode, representing the processing of one tile per PGE execution. The geolocation angular data process (MOD_PRMGR) and Land QA process (MOD_PRLQA) are executed after the L2G pointer map process (MOD_PRMGPNTR) for each profile.

The Production Rules for PGE12 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Metadata Based Query,
- Minimum Number of Granules (defaulted to 1),
- Runtime Parameters.

Data Files

Dynamic Product Input ESDT

MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath (R) 1
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Dynamic Product Output ESDT

MODPT1KD	MODIS/Terra Observation Pointers Daily L2G Global 1km ISIN Grid Day (Selected tiles over North America are exported) (A _M) (A _D) 1
MODPT1KN	MODIS/Terra Observation Pointers Daily L2G Global 1km ISIN Grid Night (Selected tiles over North America are exported) (A _M) (A _D) 1

MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m ISIN Grid (Selected tiles over North America are exported) (A _M) (A _D) 1
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m ISIN Grid (Selected tiles over North America are exported) (A _M) (A _D) 1
MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km ISIN Grid Day (A _M) (A _D) 1
MODMGGAN	MODIS/Terra Geolocation Angles Daily L2G Global 1km ISIN Grid Night (A _M) (A _D) 1
MODPTPGD	MODIS/Terra Polar Observation Pointers Daily L2G Global 1km EASE-Grid Day (A _M) 1
MODPTPGN	MODIS/Terra Polar Observation Pointers Daily L2G Global 1km EASE-Grid Night (A _M) 1
MODPTPHD	MODIS/Terra Observation Pointers Daily L2G 500m EASE-Grid (A _M) 1
MODPTPQD	MODIS/Terra Observation Pointers Daily L2G 250m EASE-Grid (A _M) 1
MODMGPGD	MODIS/Terra Polar Geolocation Angles Daily L2G Global 1km EASE-Grid Day (A _M) 1
MODMGPGN	MODIS/Terra Polar Geolocation Angles Daily L2G Global 1km EASE-Grid Night (A _M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (IM) 4*
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*Maximum number

Dynamic Runtime Parameters for Operations

TILEID	<Tile identification number (value = 8 digit integer that specifies the specific tile within the current requested tile scheme)>
TILEMODE	<Setting for generation of tiles produced in daytime or nighttime (Day = DayNightFlag setting of "Day" or "Both" Night = DayNightFlag setting of "Night")>
MAXOUTPUTRES	<Setting for highest resolution of products (operational setting for day mode="500 m"; operational setting for night mode = "1km")> SatelliteInstrument<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

L_PRODUCT	<Type of pointer and geolocation angle products to generate. In Day mode the resolution is 1km for Sea Ice, Fire, and Surface Reflectance; 500m for Snow Cover and Surface Reflectance. In Night Mode the resolution is 1 km for Sea Ice and Fire. (Value for Operations for day mode = "G"; for night mode ="g")>
DEEPOCNFLAG	<Setting for inclusion or exclusion of deep ocean pixels. Yes = all pixels, including Ocean, will be processed; No = Ocean pixels will not be processed. (Value for operations = Yes)>
coverage_min	<Normal percentage cover minimum to control pointer output volume (Value for operations = 24.0)>
EXACTMATCH	<Requirement for exact match of pixel and grid cell intersection Values are Y = yes, N = No. Value for day mode operations = "NNN"; value for night mode operation = "NN")>
L2GFORMAT	<Mode for L2G output format: full or compact (Value for operations = "compact")>
layer_1st_sel	<First layer selection criteria is the "maximum observation coverage" as opposed to alternative of "nearest neighbor",

(Value for operations = "maximum observation coverage")>

cov_cal_method <Coverage calculation method. (Value for operations is by area = "area")>

PNTRFORMAT <Mode for pointer output format: full or compact (Value for operations = "compact")>

PGE12 Version <Version of PGE12 that appears in the ciList delivered with the code>

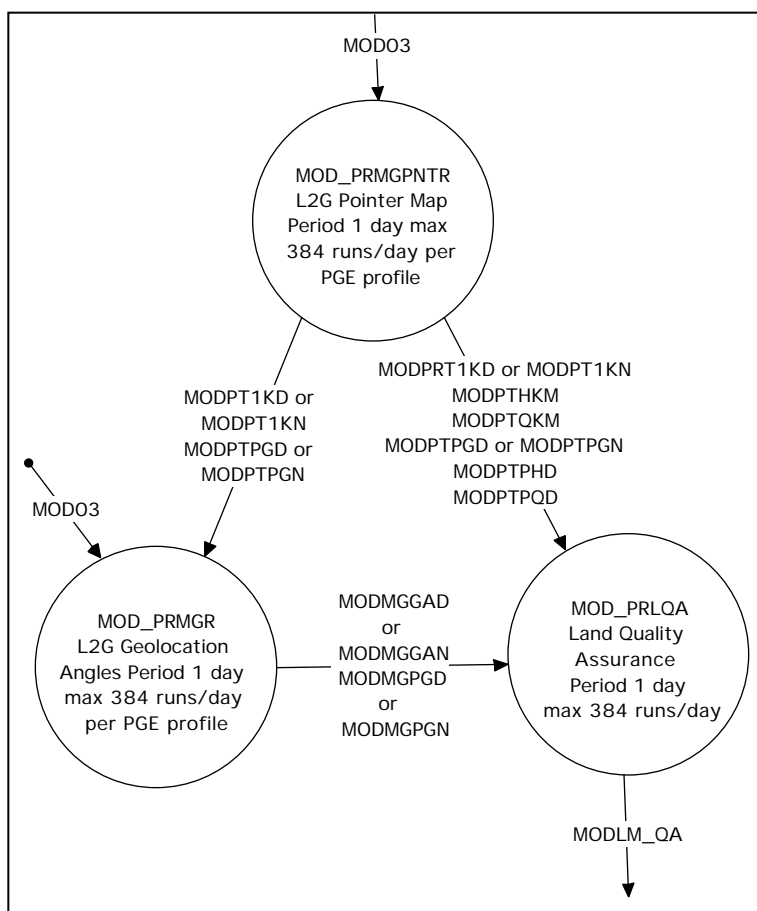


Figure 4-6 PGE12 Structure

4.13. Level 2G Land Surface Reflectance/Fire (PGE13)

PGE13 performs the daily L2G Land Surface Reflectance/Fire processing at MODAPS

Purpose

PGE13 produces the L2G Land Surface Reflectance products (MOD09GHK, MOD09GQK, and MOD09GST) and the L2G Thermal Anomalies/Fire product (MOD14GD and MOD14GN in day and night mode, respectively). It also produces the Land QA product (MODLM_QA).

Structure

PGE13 consists of the L2G Land Surface Reflectance/Fire process (MOD_PRMGR) and the Land QA process (MOD_PRLQA). MOD_PRMGR is a general purpose process which will generate L2G Land products, including the surface reflectance and thermal anomalies.

MODAPS V1 Production

PGE13 runs in MODAPS V1 Loader MDL5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. Currently MODAPS runs two PGE 13 profiles to produce the day mode daily Surface Reflectance and Thermal Anomalies/Fire products and the night mode daily Thermal Anomalies/Fire product. Products currently archived at MODAPS are the daily L2G MOD09GHK, MOD09GST, MOD09GQK, MOD14GD, and MOD14GN. MODAPS exports all of these products to the PDR Server for archive and distribution at the EDC DAAC. MODAPS Interim products are 4 granules of MODLM_QA for day mode and 1 granule of MODLM_QA for night mode.

MODAPS V2 Production

PGE13 runs in MODAPS V2 Recipe AM1M_L5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. Currently MODAPS runs two PGE 13 profiles to produce the day mode daily Surface Reflectance and Thermal Anomalies/Fire products and the night mode daily Thermal Anomalies/Fire product. Products currently archived at MODAPS are the daily L2G MOD09GHK, MOD09GST, MOD09GQK, MOD14GD, and MOD14GN. MODAPS exports all of these products to the PDR Server for archive and distribution at the EDC DAAC. MODAPS Interim products are 4 granules of MODLM_QA for day mode and 1 granule of MODLM_QA for night mode.

Production Rules

PGE13 processes the Land Surface Reflectance at 250 m, 500 m, and 1 km resolutions and the Thermal Anomalies/Fire at 1 km resolution. All products are generated in the same PGE run in Operations. All of the Land Surface Reflectance products are produced only in day mode. The Thermal Anomalies product is produced separately in day mode and night mode.

For the MODIS SDPS, tile schemes in the Integerized Sinusoidal Projection have been defined and registered in MODAPS. These tile schemes are listed in Table 4-2 with the MODIS Land PGE profiles that use them. The tile regions include two for North America, and one each for South America, Africa, and Asia. Each of the Land Surface Reflectance products in day mode and the Thermal Anomalies/Fire product in day mode and night mode are processed using all of these five tile schemes. Since all products can be made during the same PGE run and all tile schemes at MODAPS are configured into one file, MODAPS requires only two profiles the day mode and night mode. The profiles are identified by three types of input. First, the profile is identified by a static runtime parameter (L_PRODUCT) in the PCF. Table 4-2 shows the values of the L_PRODUCT associated with each PGE profile. Second, the tile scheme distinguishes which geographical region is to be processed by the PGE profile. Third, a metadata query on the DayNightFlag distinguishes the day and night products. Using the Metadata Based Query Production Rule, a selection of granules of MOD09 and MOD14 with DayNightFlag set to either "Day" or "Both" will be made for PGE13 profiles at registration to generate all surface reflectance products and the thermal anomalies products. There should be no MOD09 granules with the DayNightFlag set to "Night"; the query is needed for MOD14 granules. A selection of granules of MOD14 with the DayNightFlag set to "Night" will also be made for PGE13 profiles at registration to generate the thermal anomalies product.

The maximum number of Land tiles over the surface of the Earth defined in the Integerized Sinusoidal projection is 384. Of these 338 are land and 130 are sea ice.

Each PGE13 profile runs once per tile per day after the L2G Pointer (PGE12) has completed. The Period Specification Production Rule is used to activate PGE13. The operational scenario is a maximum of 338 activations per day for each PGE13 profile, representing the processing of one tile of land surface reflectance or thermal anomalies per PGE execution.

PGE13 requires the Latitude/Longitude Tiling Production Rule. To execute PGE13, a Latitude/Longitude tile definition file must be associated with the PGE during registration at MODAPS. For each individual execution, MODAPS will create an instantiation of PGE13 with a particular TileID and Tile mode and pass these back to the PGE as Runtime Parameters. The current version of PGE13 determines the TileID from the filename rather than the runtime parameter.

The required inputs for PGE13 profile are matching granules of the surface reflectance (MOD09) or of the thermal anomalies (MOD14) and the pointers (MODPT1KD, MODPT1KN, MODPTHKM, and MODPTQKM) at the resolution identified in Table 4-2. The number of granules overlapping a particular tile for a daily PGE run may be as few as one or even zero. If there are zero granules, the PGE is not run for that tile. For all PGEs requiring the Latitude/Longitude Tiling Production Rule, the Minimum Number of Granules will be set to a default of one.

PGE13 contains a static runtime parameter which can be set to require an exact match of pixel and grid cell intersection between input L2 granules and geolocation (MOD03) granules. If not set, PGE runs correctly for granules with overlap available and omits others. However, the extra input granules are still in Input Parameter list in the inventory metadata..

The Production Rules for PGE13 are:

- Period Specification
- Latitude/Longitude Tiling
- Minimum Number of Granules (default set to 1)
- Runtime Parameters
- Metadata Based Query

Data Files

Dynamic Product Input ESDT

MOD09	MODIS/Terra Land Surface Reflectance 5-Min L2 Swath 250m, 500m and 1km (R) 1
MOD14	MODIS/Terra Thermal Anomalies/Fire 5-Min L2 Swath 1km (R) 1
MODPT1KD	MODIS/Terra Observation Pointers Daily L2G Global 1km ISIN Grid Day (R) 1

MODPT1KN	MODIS/Terra Observation Pointers Daily L2G Global 1km ISIN Grid Night (R) 1
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m ISIN Grid (R) 1
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m ISIN Grid (O) 0

Dynamic Product Output ESDT

MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m ISIN Grid (A _M) (A _D) 1
MOD09GQK	MODIS/Terra Surface Reflectance Daily L2G Global 250m ISIN Grid (A _M) (A _D) 1
MOD09GST	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km ISIN Grid (A _M) (A _D) 1
MOD14GD	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km ISIN Grid Day (A _M) (A _D) 1
MOD14GN	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km ISIN Grid Night (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1*
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* 4 maximum per run

Dynamic Runtime Parameters for Operations

TILEID	<Tile identification number (value = 8 digit integer that specifies the specific tile within the current requested tile scheme)>
TILEMODE	<Setting for generation of tiles produced in daytime or nighttime (Day = DayNightFlag setting of "Day" or "Both"; Night = DayNightFlag setting of "Night")>

SatelliteInstrument <Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

L_PRODUCT	Type of products to generate: t=item state r=reflectance 250 m R=reflectance 500 m F=fire day f=fire night (Value for operations for day mode = trRF; value for operations for night mode = f)
EXACTMATCH	Requirement for exact match of pixel and grid cell intersection: Y = Yes, N = No (Value for operations for the 4 inputs in day mode = "NNNN"; Value for operations for the 1 input in night mode = "N")
L2GFORMAT	Mode for L2G product output format (Value for operations = "compact")
PGE13 Version	<Version of PGE13 that appears in the ciList delivered with the code>

4.14. Level 2G Snow Cover (PGE14)

PGE14 is the daily L2G Snow Cover process executed at MODAPS.

Purpose

PGE14 produces L2G Snow Cover product (MOD10L2G) and the Land QA product (MODLM_QA).

Structure

PGE14 consists of the daily L2G Snow Cover process (MOD_PRMGR) process and the Land QA process (MOD_PRLQA). MOD_PRMGR is a general purpose process which will generate L2G Land products including Snow Cover.

MODAPS V1 Production

PGE14 runs in MODAPS V1 Loader MDL5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE14 for each of the Land tiles configured in the data processing system upon the availability of the MOD10_L2 granules for the day and after PGE12 has generated the MODPTHKM pointer files. Products currently archived at MODAPS are the daily, tiled granules of MOD10L2G. MODAPS Interim product are granules of MODLM_QA. No products from PGE14 are currently archived at any of the DAAC.

MODAPS V2 Production

PGE14 runs in MODAPS V2 Recipe AM1M_L5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE14 for each of the Land tiles configured in the data processing system upon the availability of the MOD10_L2 granules for the day and after PGE12 has generated the MODPTHKM pointer files. Products currently archived at MODAPS are the daily, tiled granules of MOD10L2G. MODAPS Interim product are granules of MODLM_QA. No products from PGE14 are currently archived at any of the DAAC.

Production Rules

PGE14 runs once per tile per day after L2G Pointers (PGE12) has completed. PGE14 uses only data in day mode. The input data granule with the DayNightFlag set to "Day" or "Both" will be retrieved for the PGE run. The input MOD10_L2 Snow Cover product is produced only in day mode. The operational scenario is nominally 338 activations per day, representing the processing of one tile of Snow Cover per PGE execution.

PGE14 requires the Latitude/Longitude Tiling Production Rule. To execute PGE14, a Latitude/Longitude tile definition file must be associated with the PGE. For each individual execution, MODAPS will create a recipe instance with a particular TileID and pass the TileID back to the PGE as a Runtime Parameter. The current version of PGE14 determines the TileID from the file names rather than the runtime parameter. Since the tile schemes at MODAPS are merged into one file, MODAPS requires only one profile.

The required inputs for PGE14 are matching granules of MOD10_L2 and MODPTHKM. Using the Metadata Based Query Production Rule, the input granules of MODPTHKM are selected for either “Day” or “Both” values of the DayNightFlag. No Metadata Query is needed for the MOD10_L2 since it is only produced in day mode. The number of granules overlapping a particular tile for a daily PGE run may be as few as one or even zero. If there are zero granules, the PGE is not run for that tile. Thus, for ESDTs input to PGE requiring the Latitude/Longitude Tiling Production Rule, the Minimum Number of Granules is always set to one.

The Production Rules for PGE14 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Metadata Based Query,
- Minimum Number of Granules (defaulted to 1),
- Runtime Parameters.

Data Files

Dynamic Product Input ESDT

MOD10_L2	MODIS/Terra Snow Cover 5-Min L2 Swath 500m (R) 1
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m ISIN Grid (R) 1

Dynamic Product Output ESDT

MOD10L2G	MODIS/Terra Snow Cover Daily L2G Global 500m ISIN Grid (A _M) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters

TileID	<Tile identification number (value = 8 digit integer that specifies tile within the current requested tile scheme)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

L_PRODUCT	s
EXACT MATCH	N
L2G FORMAT	compact
PGE14 Version	<Version of PGE14 that appears in the ciList delivered with the code>

4.15. Level 2G Sea Ice Extent (PGE15)

PGE15 is the daily L2G Sea Ice Extent process executed at MODAPS.

Purpose

PGE15 produces the L2G daily Sea Ice Extent product (MOD29GD and MOD29GN) in day and night modes, respectively, and the Land QA product (MODLM_QA).

Structure

PGE15 consists of the daily L2G Sea Ice Extent process (MOD_PRMGR) and the Land QA process (MOD_PRLQA). MOD_PRMGR is a general purpose process which will generate L2G Land products, including the Sea Ice Extent.

MODAPS V1 Production

PGE15 runs in MODAPS V1 Loader MDL5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE15 for each of the Land tiles configured in the data processing system upon the availability of the MOD29 granules for the day and after PGE12 has generated the MODPTPGD and MODPTPGN pointer files. Products currently archived at MODAPS are the daily, tiled granules of MOD29PGD and MOD29PGN. MODAPS Interim products are granules of MODLM_QA. No products from PGE15 are currently archived at any of the DAACs:

MODAPS V2 Production

PGE15 runs in MODAPS V2 Recipe AM1M_L5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE15 for each of the Land tiles configured in the data processing system upon the availability of the MOD29 granules for the day and after PGE12 has generated the MODPTPGD and MODPTPGN pointer files. Products currently archived at MODAPS are the daily, tiled granules of MOD29PGD and MOD29PGN. MODAPS Interim products are granules of MODLM_QA. No products from PGE15 are currently archived at any of the DAACs:

Production Rules

Currently MODAPS is producing the polar EASE-Grid products and the production scenario will only be discussed for the polar product. However PGE15 still retains the capability of producing the ISIN Grid products.

PGE15 runs once per tile per day, after L2G Pointers (PGE12) has completed. Day mode (MOD29PGD) and night mode (MOD29PGN) data are produced in separate PGE runs. PGE15 will require separate, PGE profiles, one for data granules with the DayNightFlag set to “Day” or “Both” and one for data granules with the DayNightFlag set to “Night.” The operational scenario is nominally 130 activations per day for day mode and night mode, representing the processing of one Sea Ice tile per PGE execution.

PGE15 requires the Latitude/Longitude Tiling Production Rule. To execute PGE15, a Latitude/Longitude tile definition file must be associated with the PGE at registration in MODAPS. For each individual PGE execution, MODAPS will create a recipe instance with a particular TileID and pass this TileID as a Runtime Parameter for the PGE. MOD29PGD and MOD29PGN are produced in separate runs for day and night modes under two tiling schemes as shown in Table 4-2. Since tile schemes at MODAPS are merged into one file, MODAPS requires two profiles, one for day mode and one for night mode.

The required inputs for PGE15 are matching granules of MOD29 and MODPTPGD or MODPTPGN Using the Metadata Based Query Production Rule, a query is performed on the DayNightFlag in MOD29 and MODPTPGD or MODPTPGN to retrieve the granules for the day mode PGE profiles and the night mode PGE profiles. At the PGE installation the value for the day mode is set to “Day” or “Both” and for the night mode is set to “Night.” The number of granules overlapping a particular tile for a daily PGE run may be as few as one or even zero. If there are zero granules, the PGE is not run for that tile. Thus, for ESDTs input to PGE requiring the Latitude/Longitude Tiling Production Rule, the Minimum Number of Granules is set to one as a default.

The Production Rules for PGE15 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Metadata Based Query,
- Minimum Number of Granules (defaulted to 1),
- Runtime Parameters.

Data Files

Dynamic Product Input ESDT

MOD29	MODIS/Terra Sea Ice Extent 5-min L2 Swath 1km
	(R) 1

MODPTPGD	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Day (R) 1
MODPTPGN	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Night (R) 1
MODPT1KD	MODIS/Terra Observation Pointers Daily L2G Global 1km ISIN Grid Day (Alternate Integerized Sinusoidal grid product) (R) 1
MODPT1KN	MODIS/Terra Observation Pointers Daily L2G Global 1km ISIN Grid Night (Alternate Integerized Sinusoidal grid product) (R) 1

Dynamic Product Output ESDT

MOD29PGD	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Day (A _M) 1
MOD29PGN	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Night (A _M) 1
MOD29GD	MODIS/Terra Sea Ice Extent Daily L2G Global 1km ISIN Grid Day (Alternate Integerized Sinusoidal grid product) (A _M) 1
MOD29GN	MODIS/Terra Sea Ice Extent Daily L2G Global 1km ISIN Grid Night (Alternate Integerized Sinusoidal grid product) (A _M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

TILEID	<Tile identification number (value = 8 digit integer that specifies a specific tile within the current requested tile scheme)>
TILEMODE	<Setting for generation of tiles produced in daytime or nighttime. (Day= DayNightFlag Setting of "Day" or "Both"; Night = DayNightFlag Setting of "Night")>

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
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Static Runtime Parameters for Operations

L_PRODUCT	<Type of product to generate. Value for Operations: I = Sea Ice Day Mode, i = Sea Ice Night Mode>
EXACT MATCH	<Requirement for exact match of pixel and grid intersection (value for operations = N)>
L2GFORMAT	<Mode for L2G product output format (value for operations = compact)>
PGE15 Version	<Version of PGE15 that appears in the ciList delivered with the code>
REPROCESSINGACTUAL metadata field	reprocessed
REPROCESSINGPLANNED metadata field	further update is anticipated

4.16. Level 2/Level 3 Land Surface Temperature (PGE16)

PGE16 is the daily L2 and L3 Land Surface Temperature (LST) processing executed at MODAPS.

Purpose

PGE16 produces the L2 granule LST/Emissivity product (MOD11_L2) and the L3 tiled Gridded Daily LST/Emissivity products (MOD11A1 and MOD11B1) at 1km and 5km resolutions, respectively. The tiled products are updated by multiple process runs within PGE16. It also produces the Land QA product (MODLM_QA).

Structure

PGE16 consists of the L2 granule and L3 gridded LST/Emissivity process (MOD_PR11) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

PGE16 runs in MODAPS V1 Loader MDL4, which is executed every day upon the availability of matching sets of MOD021KM, MOD07_L2, MOD03, and MOD35_L2 granules covering the daily processing period. The 96-Day Land Cover Type (MOD12Q1) tiles are also required as input. MOD10_L2 is an optional input. MODAPS divides the production into six geographical zones of 30 degrees latitude each. Consecutive zones must be run at non-overlapping processing times to avoid writing data into the same tiled output files simultaneously. Thus MODAPS runs alternating sets of three zones each at a time. PGE16 is executed once for each set of Level 2 input granules. Products archived at MODAPS are 5-minute granules of MOD11_L2 and tiled granules of MOD11A1 and MOD11B1. The update files of MOD11UPD and granules of MODLM_QA are MODAPS Interim products. MODAPS exports MOD11_L2, MOD11A1, and MOD11B1 to the PDR Server for archive and distribution at the EDC DAAC.

MODAPS V2 Production

PGE16 runs in MODAPS V2 Recipe AM1M_L4, which is executed every day upon the availability of matching sets of MOD021KM, MOD07_L2, MOD03, and MOD35_L2 granules covering the daily processing period. The 96-Day Land Cover Type (MOD12Q1) tiles are also required as input. MOD10_L2 is an optional input. MODAPS divides the production into six geographical zones of 30 degrees latitude each. Consecutive zones must be run at non-overlapping processing times to avoid writing data into the same tiled output files simultaneously. Thus MODAPS runs alternating

sets of three zones each at a time. PGE16 is executed once for each set of Level 2 input granules. Products archived at MODAPS are 5-minute granules of MOD11_L2 and tiled granules of MOD11A1 and MOD11B1. The update files of MOD11UPD and granules of MODLM_QA are MODAPS Interim products. MODAPS exports MOD11_L2, MOD11A1, and MOD11B1 to the PDR Server for archive and distribution at the EDC DAAC.

Production Rules

PGE16 runs once per day as a global process. The Period Specification Production Rule is required for the daily processing. The required inputs are matching granules of MOD021KM, MOD03, MOD07_L2, MOD35_L2, and MOD12Q1; MOD10_L2 is an optional input to be staged if it is available. There will be a specified wait time and Minimum Number of Granules for each required input data type, after which PGE16 will run if the minimum requirements are met.

The volume of input data for the daily run of PGE16 is very large. Since only seven bands of the L1B MOD021KM are required for PGE16, subsetting of these granules is planned to be performed dynamically when the PGE is run. The subsetted product will then be staged and used in processing. However, PGE16 will run without the subsetting at launch.

The operational scenario is one activation per day, representing the processing of up to 288 granules per PGE execution. Since only about 240 granules cover Land tiles, only 240 executions of MODPR11 generate products. Due to restrictions of percent of data products to be produced during the first year, the actual number of granules included for PGE16 may be less than 240. Successful execution of PGE16 each day depends on the sorting and matching of the various types of input products and the output products. PGE16 should not be executed within the script for any 5-minute granule period unless all of the required input files are available. The script should skip granule sets which are not complete. The MODAPS script sorts and matches all Level 2 input granules according to the order of the MOD021KM L1B granules in the PCF and sets the output MOD11_L2 granules in the same order in the PCF. The MODAPS script also sorts and matches all output MOD11 UPD update_1st files, MOD11A1, and MOD11B1 tiled output files in the PCF according to the order of the MOD12Q1 input tiled files in the PCF. A script will control the sorting and processing of one set of matching granules of the required inputs at a time to prevent simultaneous writing to the same file.

In the MODAPS PDPS, PGE16 runs separately on 6 zones each covering 30 degrees in latitude. MODAPS stages granules and tiles that fall into one of 6 zones. However, only non-adjacent zones can be run at the same time in order to avoid processing multiple input granule sets that might cause the writing of L3 data into the same tiles simultaneously. Thus, zones 1, 3, and 5 are run simultaneously. When these zones are complete, zones 2, 4, and 6 are run. All of the tiled products, MOD11A1, MOD11B1, and MOD11UPD, must be kept in the staging area for PGE16 until all of the granules for the day have been processed. These tiled products are input to subsequent PGE16 runs and are updated throughout the day.

The LST L2 granules will be completed at each execution of process MOD_PR11. The L3 gridded LST products will be updated each time MOD_PR11 is executed. PGE16 will generate one granule of gridded LST MOD11A1 and MOD11B1 for each tile containing data for the day. Interim files of MOD11UPD, update_lst, containing data to go into the tiled products will be produced during the PGE run. All MOD11UPD files must be kept in the MODAPS production system for later daily PGE16 processing. At the end of the PGE script, the L3 gridded LST products at 1km and 5km resolutions will be ready for archiving.

During much of the first year of the mission the dynamic MOD12Q1 products will not be available. The MOD12Q1 accumulated 96-day Land Cover Type file from the previous run of PGE41 will not be used in the first year of the mission; static land cover files in MOD11LCU will be used instead. The Land Cover Group at the University of Maryland (UMD) will prepare static Land Cover Type files in the same format as MOD12Q1. These files will be installed in the MOD12Q1 collection for use until the MOD12Q1 products are generated by PGE41. PGE16 will use the Advanced Temporal Production Rule to acquire the previous MOD12Q1 granule by setting a delta time for the beginning of the processing period for PGE16.

PGE16 has a static runtime parameter switch to either use the standard MOD021KM L1B granules as input or subsetting L1B granules which contain data from only the MODIS bands needed by PGE16. This runtime parameter, SUBSET_1B, is set to 0 for the standard product and to 1 for the subsetting product. For the current MODAPS operations the SUBSET_1B is set to 0.

PGE16 has a second static runtime parameter, N_READ_LINES, which defines the number of scan lines of the input granule to be read at one time. It should have a value which is a multiple of 10s and can evenly divide the total number of scan lines. The default for operations is 10.

PGE16 has a third static runtime parameter, IGNORE_UNCERT, which acts as a switch for the PGE to ignore or accept granules of L1B with the uncertainty flag set for bad quality value. This runtime parameter should have a value of 1 for operations, causing the L1B quality flag to be ignored.

The Production Rules for PGE16 are:

- Period Specification,
- Advanced Temporal (Post-Launch),
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD11LCV	MODIS/Terra Land Cover Input Files for MOD_PR11
MOD11LUW	MODIS/Terra Land Surface Temperature Split Window LUT for Production of MOD11

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 288*
MOD07_L2	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km (R) 288*
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 288*
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250 and 1km (R) 1
MOD10_L2	MODIS/Terra Snow Cover 5-Min L2 Swath 500m (O) 288*
MOD12Q1	MODIS/Terra Land Cover Type 96-Day L3 Global 1km ISIN Grid (Previous 96-Day Land Cover Type will be staged when UMD generates products) (R) 326*

Dynamic Product Output ESDT

MOD11_L2	MODIS/Terra Land Surface Temperature/Emissivity 5-Min L2 Swath 1km (A _M) (A _D) 288*
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MOD11A1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 1km ISIN Grid (A _M) (A _D) 326*
MOD11B1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 5km ISIN Grid (A _M) (A _D) 326*
MOD11UPD	MODIS/Terra Land Surface Temperature Update Files L3 Global 1km ISIN Grid (I _M) 326*

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1266*
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*Maximum per day

Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
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Static Runtime Parameters for Operations

SUBSET_1B	Switch to use either standard MOD021KM L1B granules as input or subsetted L1B granules (value for operations = 0, PGE16 will not use subsetted L1B product as input)
N_READ_LINES	Number of scan lines of input granules to be read at one time. (Value for operations = 10, read 10 scan lines at the same time for processing)
IGNORE_UNCERT	Switch to ignore or accept the L1B uncertainty flag for data quality (value for operations = 1, which means ignore this flag)
PGE16 Version	<Version of PGE16 that appears in the ciList delivered with the code>

4.17. Oceans Ancillary Meteorological Preprocess (PGE17)

PGE17 performs the Oceans ancillary meteorological preprocessing executed at MODAPS.

Purpose

PGE17 produces the preprocessed NMC ancillary data (MODOCNMC) for MODIS oceans processing. It converts 1-Degree NCEP GDAS data from GRIB to HDF format.

Structure

PGE17 consists of the 1 Degree NCEP GDAS ancillary data preprocessor (MOD_PRNMC).

MODAPS V1 Production

PGE17 is run by the MODAPS V1 Scheduler upon the arrival and ingest of a file of GDAS_0ZF from the GSFC DAAC.

A corresponding 6-hour granule of MODOCNMC is generated from each execution of the PGE and is archived at MODAPS. MODAPS exports these products to the PDR Server for archive and distribution at the GSFC DAAC.

MODAPS V2 Production

PGE17 is run by the MODAPS V2 Recipe AM1M_ANC_O0a upon the arrival and ingest of a file of GDAS_0ZF from the GSFC DAAC.

A corresponding 6-hour granule of MODOCNMC is generated from each execution of the PGE and is archived at MODAPS. MODAPS exports these products to the PDR Server for archive and distribution at the GSFC DAAC.

Production Rules

PGE17 runs once for each 1 Degree NCEP GDAS (GDAS_0ZF) ancillary data file and is activated 4 times per day whenever the six-hour ancillary file is available.

The Production Rule for PGE17 is:

- Basic Temporal

Data Files

Dynamic Ancillary Product Input ESDT

GDAS_0ZF 1 Degree NCEP GDAS (R) 1

Dynamic Ancillary Product Output ESDT

MODOCNMC NMC ancillary data for MODIS Oceans processing
(Preprocessed 1 Degree NCEP GDAS (GDAS_0ZF)
National Meteorological Center (NMC) Ancillary data
for MODIS Oceans Processing; converted from GRIB
to HDF-EOS Format.) (A_M) (A_D) 1

4.18. Oceans Ancillary Reynolds Sea Surface Temperature Preprocess (PGE18)

PGE18 performs the Oceans Ancillary Reynolds Sea Surface Temperature (SST) preprocessing executed at MODAPS.

Purpose

PGE18 produces the preprocessed Reynolds SST ancillary data (MODOCREY) for MODIS oceans processing. It converts the Reynolds SST data from native ASCII to HDF format.

Structure

PGE18 consists of the Reynolds SST ancillary data preprocessor (MOD_PRREY).

MODAPS V1 Production

PGE 18 has not yet been delivered by the MODIS Science Team. The production scenario is based upon pre-processing of the other Oceans ancillary data. PGE18 is run by the MODAPS V1 Scheduler upon the arrival and ingest of a file of REYNSST from the GSFC DAAC.

A corresponding 7-day granule of MODOCREY is generated from each execution of the PGE and is archived at MODAPS. MODAPS exports these products to the PDR Server for archive and distribution at the GSFC DAAC.

MODAPS V2 Production

PGE 18 has not yet been delivered by the MODIS Science Team and its implementation is under consideration. The production scenario is based upon pre-processing of the other Oceans ancillary data. PGE18 is run by the MODAPS V2 Recipe AM1M_ANC_O0c upon the arrival and ingest of a file of REYNSST from the GSFC DAAC.

A corresponding 7-day granule of MODOCREY is generated from each execution of the PGE and is archived at MODAPS. MODAPS exports these products to the PDR Server for archive and distribution at the GSFC DAAC.

Production Rules

PGE18 runs once for each Reynolds SST (REYNSST) ancillary data file and is activated once per week whenever the weekly file is available.

The Production Rule for PGE19 is:

- Basic Temporal

Data Files

Dynamic Ancillary Product Input ESDT

REYNSST	Reynolds Weekly Sea Surface Temperature (SST)
(R)	1

Dynamic Ancillary Product Output ESDT

MODOCREY	Reynolds SST ancillary data for MODIS Oceans processing (Preprocessed Reynolds SST ancillary data for MODIS Oceans processing; converted from ASCII to HDF-EOS Format.)
(A _M)	(A _D)
	1

4.19. Oceans Ancillary Ozone Preprocess (PGE19)

PGE19 performs the Ocean ancillary ozone preprocessing executed at MODAPS.

Purpose

PGE19 produces the Oceans ancillary ozone preprocessed product (MODOCOZN). It converts TOMS Column Ozone Earth Probe data from ASCII to HDF format.

Structure

PGE19 consists of the Oceans Ancillary Ozone Preprocessor (MOD_PROZN).

MODAPS V1 Production

PGE19 is run by the MODAPS V1 Scheduler upon the arrival and ingest of a file of OZONEEP from the GSFC DAAC.

A corresponding 24-hour granule of MODOCOZN is generated from each execution of the PGE and is archived at MODAPS. MODAPS exports these products to the PDR Server for archive and distribution at the GSFC DAAC.

MODAPS V2 Production

PGE19 is run by the MODAPS V2 Recipe AM1M_ANC_O0b upon the arrival and ingest of a file of OZONEEP from the GSFC DAAC.

A corresponding 24-hour granule of MODOCOZN is generated from each execution of the PGE and is archived at MODAPS. MODAPS exports these products to the PDR Server for archive and distribution at the GSFC DAAC.

Production Rules

PGE19 runs once per TOMS Column Ozone Earth Probe daily ancillary data file. PGE19 is activated one time per day whenever the daily ancillary file is available.

The Production Rule for PGE19 is:

- Basic Temporal

Data Files

Dynamic Product Input ESDT

OZONEEP	TOMS Column Ozone (Earth Probe)	(R)	1
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Dynamic Product Output ESDT

MODOCOZN	TOMS ozone data for MODIS Oceans Processing (Preprocessed TOMS Column Ozone for Oceans processing; converted from ASCII to HDF-EOS Format.) (A _M) (A _D) 1
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4.20. Level 3 Daily Oceans Interim (PGE20)

PGE20 consists of the interim L3 daily Ocean process executed at MODAPS. This is the first in a series of Ocean time-binning PGEs. It is run separately for each Ocean parameter (36 Ocean Color, 4 SST, or 35 QC).

Purpose

PGE20 produces the L3 Oceans Interim Daily products. The five types of products are 36 daily time-binned composites of Ocean Color parameters for daytime data, daily time-binned SST composites for two parameters in day and night modes, 15 Ocean Color QC parameters, 20 SST QC parameters, and L3 interim daily maps of these products.

Structure

PGE20 consists of the Ocean L3 time-binning process (MOD_PRmtbin) which is run multiple times to perform the daily compositing of the output Ocean Color and SST products and the L3 mapping process (MOD_PRmspc and MOD_PRmmap). Figure 4-7 shows the structure of PGE20.

MODAPS V1 Production

PGE 20 is run in MODAPS V1 Loader MD02, which is executed daily upon the availability of all of the MODOCB_{nn} (where nn=parameters 1...36), MOD28B_{mm} (where mm=parameters D1, D2, N1, N2), and corresponding QA products for the current Ocean Data Day being processed. Products archived at MODAPS are MODOCA_{nn}, MOD28A_{mm}, MODOQA_{qq} (where qq=parameters 51...61, 63...66), MODSQA_{rr} (where rr=parameters D1...D9, DA, N1...N9, NA), MO{04, 36} {M, S, N, Q, F, 1, 2, 3} A_{##} (where ## =1...36, D1, D2, N1, N2), and MO{04, 36} MA_{qq} (where qq=parameters 41...61, 63...66, 69...78). MODAPS exports MODOQA_{qq}, MODSQA_{rr}, and MO04MA_{qq} to the PDR Server for archive and distribution at the GSFC DAAC. MODAPS Interim products for the same period are granules of MODOCA_{nn}, MOD28A_{mm}, MO{04, 36} {M, S, N, Q, F, 1, 2, 3} A_{##}, and MO36MA_{qq}. MODAPS also produces temporary files of MODOCF_{nn} and MOD28F_{mm}, which are discarded when the PGE completes.

MODAPS V2 Production

PGE 20 is run in MODAPS V2 Recipe AM1M_O2, which is executed daily upon the availability of all of the MODOCB_{nn} (where nn=parameters 1...36), MOD28B_{mm} (where mm=parameters D1, D2, N1, N2), and corresponding QA products for the current Ocean Data Day being processed. Products archived at MODAPS are MODOCA_{nn}, MOD28A_{mm}, MODOQA_{qq} (where qq=parameters 51...61, 63...66), MODSQA_{rr} (where rr=parameters D1...D9, DA, N1...N9, NA), MO{04, 36} {M, S, N, Q, F, 1, 2, 3} A_{##} (where ## =1...36, D1, D2, N1, N2), and MO{04, 36} MA_{qq} (where qq=parameters 41...61, 63...66, 69...78). MODAPS exports MODOQA_{qq}, MODSQA_{rr}, and MO04MA_{qq} to the PDR Server for archive and distribution at the GSFC DAAC. MODAPS Interim products for the same period are granules of MODOCA_{nn}, MOD28A_{mm}, MO{04, 36} {M, S, N, Q, F, 1, 2, 3} A_{##}, and MO36MA_{qq}. MODAPS also produces temporary files of MODOCF_{nn} and MOD28F_{mm}, which are discarded when the PGE completes.

Production Rules

PGE20 runs when a full "Ocean Data Day" of PGE09 (MOD_PRmsbin) space-binned parameters of Ocean Color and PGE10 (MOD_PRmsbin) space-binned parameters of SST products has been produced. The Period Specification Production Rule is required for PGE20. This PGE is activated 75 times per day, once for each of the 36 Ocean Color parameters, once for each of the two MODIS Ocean SST parameters in either the day or night mode, and once for each of the QC parameters. The L3 interim daily composites of Ocean Color (MODOCA_{nn}) and SST (MOD28A_{mm}) are archived at MODAPS for use in subsequent Ocean processing. The corresponding Temporary products (MODOCF_{nn} and MOD28F_{mm}) are deleted when the PGE run has completed. The L3 interim daily time-binned Ocean Color and SST QC (MODOQA_{qq} and MODSQA_{rr}) products are also archived both at the MODAPS and at the GSFC DAAC. The MO{04, 36}{M, S, N, Q, F, 1, 2, 3}A_{##} maps are also archived at MODAPS; but only the MO04MA Mean maps of the QC products are archived at the GSFC DAAC.

PGE20 requires the specification of the Data Day using the special Data Day implementation of the Runtime Parameters Production Rule. For this Production Rule, MODAPS stages all input granules required for an Oceans Data Day and passes the "start dataday" and "end dataday" (both equal to current/nominal day in yyyyddd format for PGE20) to the PGE as Runtime Parameters. The retrieval algorithm for an Oceans Data Day Production Rule is equivalent to using the Advanced Temporal Production

Rule to retrieve granules adjacent to the nominal day and optionally using a Metadata Based Query on the start dataday and end dataday PSAs.

PGE20 also requires specification of one of the 75 input products for each execution. The parameter to be processed is indicated in a static runtime parameter, “band to map”, which is then passed into PGE20.

PGE20 also produces various map images for each of the 40 ocean binned-product parameters and each of the 35 ocean QC parameters. The map for each ocean binned-product parameter includes eight types of values (mean, standard deviation, number of observations, quality, common flags, and three byte flags) at two resolutions, 4km and 36km. The L2 Flag Byte 3 is only produced for parameters 13 through 25.

The Production Rules for all profiles of PGE20 are:

- Period Specification,
- Data Day,
- Runtime Parameters

Data Files

Static Input ESDT

MODOCTB	MODIS/Terra Ocean Time Binner Parameters
MODOCSPC	MODIS/Terra Ocean Space Converter Parameters
MODOCMAP	MODIS/Terra Ocean Mapper Parameters

Dynamic Product Input ESDT

One of the following for each PGE profile activation:

MODOCB_{nn}	MODIS/Terra Ocean Color Space-Binned Composite Params 1-36 5-Min L3 Global 1km ISEAG (where nn = 1-36) (R) 1*
MOD28B_{mm}	MODIS/Terra Sea Surface Temperature Space-Binned Composite Params 1-4 5-Min L3 Global 1km ISEAG (where mm = D1, D2, N1, N2) (R) 1*
MODOQB_{qq}	MODIS/Terra Ocean Color Space-Binned Composite QC Products 5-Min L3 Global 1km ISEAG (where qq = 41-61, 63-66) (R) 1*

MODSQB_{rr} MODIS/Terra Sea Surface Temperature Space-Binned Composite QC Products 5-Min L3 Global 1km ISEAG (where rr = D1-D9, DA, N1-N9, NA) (R) 1*

*per parameter

Dynamic Product Output ESDT

One matching set of the following for each PGE profile activation:

MODOCA_{nn} MODIS/Terra Ocean Color Time-Binned Interim Params 1-36 Daily L3 Global 4km ISEAG (where nn = parameters 1-36) (A_M) 1*

MOD28A_{mm} MODIS/Terra Sea Surface Temperature Time-Binned Interim Params 1-4 Daily L3 Global 4km (where mm = parameters D1, D2, N1, N2) (A_M) 1*

MODOQA_{qq} MODIS/Terra Interim Composite Ocean Color QC Products Daily L3 Global 4km ISEAG (where qq = parameters 51...61, 63...66) (A_M) (A_D) 1*

MODSQA_{rr} MODIS/Terra Interim Sea Surface Temperature QC Product Daily L3 Global 4km ISEAG (where rr = parameters D1...D9, DA, N1...N9, NA) (A_M) (A_D) 1*

*per parameter

Map Images

MO{04, 36}{M, S, N, Q, F, 1, 2, 3}A##

MODIS/Terra Interim Ocean Color and SST QC {Mean} Maps Daily L3 Global {4km} CylEqDis
 {Std. Dev.}{36km}
 {Number}
 {Quality}
 {Common Flags}
 {Flag Byte 1}
 {Flag Byte 2}
 {Flag Byte 3}

(Where: M = MODIS
 O = Oceans

{04, 36} = resolution and size:

04 = 4 km

36 = 36 km

{M, S, N, Q, F, 1, 2, 3} = values mapped:

M = Mean

S = Standard deviation

N = Number of observations

Q = Quality

F = Common flags

1 = L2 Flag Byte 1

2 = L2 Flag Byte 2

3 = L2 Flag Byte 3 (only produced for ## = 13 through 25)

A = Interim Daily

= 1 through 36 for Ocean Color parameters or D1, D2, N1,
and N2 for SST parameters or 41 through 61, 63 through 66, and 69
through 78 for QC parameters) (A_M) 1*

MO04MA_{qq} MODIS/Terra Interim Ocean Color and SST QC Mean Map Daily
L3 Global 4km CylEqDis (where qq = mean at 4km resolution for
parameters 41...61, 63...66, 69...78) (A_M) (A_D) 1*

*Per Parameter

Temporary Product Output ESDT

MODOCF_{nn} MODIS/Terra Ocean Color Temporary Composite
Params 1-36 Daily L3 Global 4km ISEAG (where nn =
parameters 1-36; used for temporary storage of daily
products.) (T_M) 25*

MOD28F_{mm} MODIS/Terra Sea Surface Temperature Temporary
Composite Params 1-4 Daily L3 Global 4km ISEAG
(where mm = D1, D2, N1, N2; used for temporary
storage of daily products) (T_M) 25

*per parameter

Dynamic Runtime Parameters for Operations

start dataday <Start Ocean Day for Data Observations>

end dataday	<End Ocean Day for Data Observations>
ParamName	<Name of parameter to process>
band to map	<Name of parameter to map>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

Static Runtime parameters for Operations

SMFLOG_ SCREEN Switch	O
time flag	A
gsfc quality	1
longitude, origin	0.0
latitude, origin	0.0
projection rotation	0.0
longitude, center	0.0
latitude, center	0.0
output image width in degrees	0.0
output image height in degrees	180.0
which quality field	B
PGEVersion	<Version of PGE20 that appears in the ciList delivered with the code>

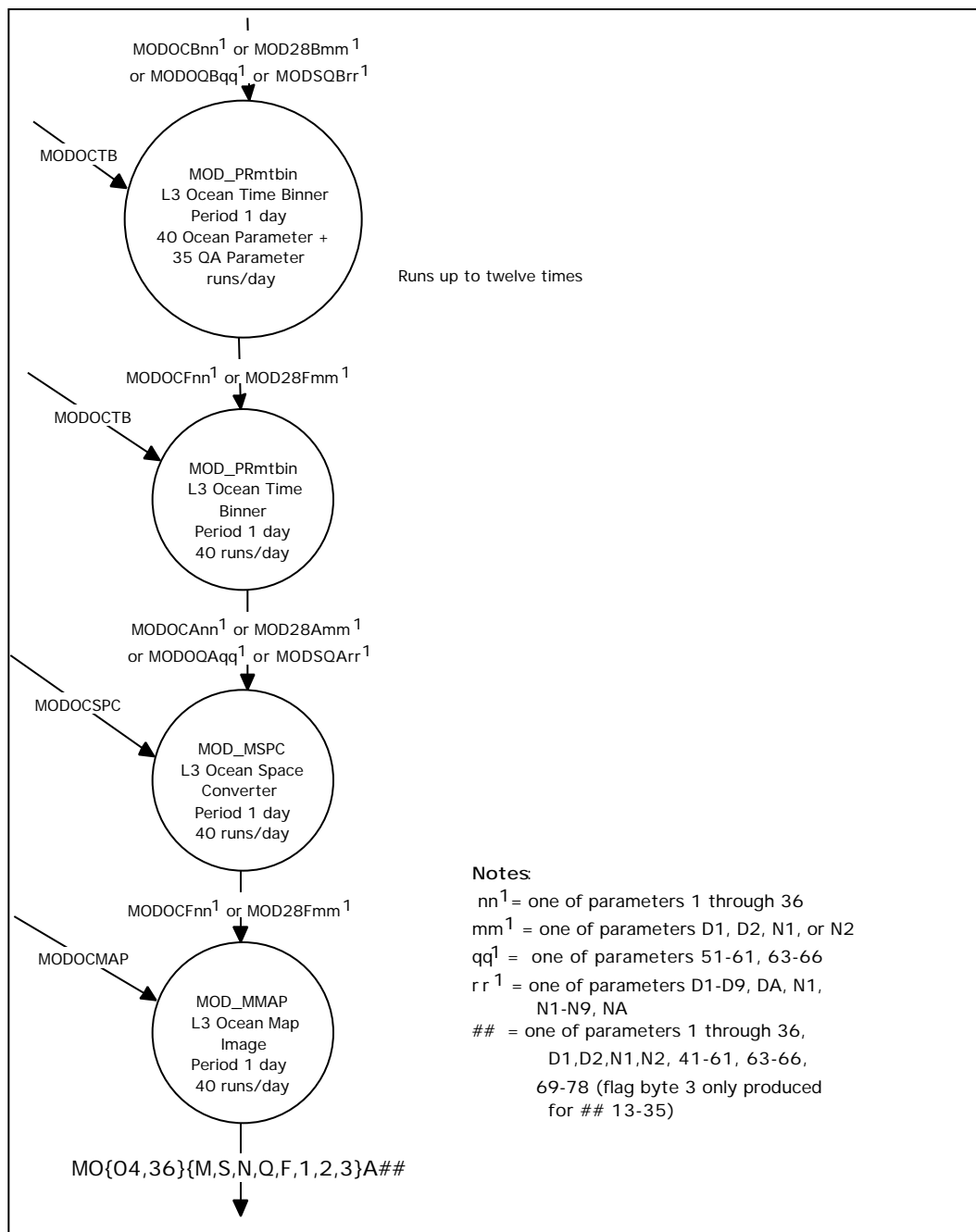


Figure 4-7 PGE20 Structure

4.21. Level 3 Land 8-Day Surface Reflectance (PGE21)

PGE21 performs the Land L3 surface reflectance processing at MODAPS.

Purpose

PGE21 produces the 8-day gridded surface reflectance product (MOD09A1), a coarse surface reflectance product (MOD09A1C) at 5km resolution, a subsetted MOD09A1 product (MOD_SS), and the Land QA product (MODLM_QA).

Structure

PGE21 consists of the L3 Land 8-Day Surface Reflectance process (MOD_PR09A) and the Land QA process (MOD_PRLQA). PGE21 also runs the Land shared MOD_PRSS.pl Script to produce the subsetted product.

MODAPS V1 Production

PGE21 runs in MODAPS V1 Loader MDL10, which is executed every 8 days upon the availability of the MODIS Land pointer files and geolocation angles (MODPTHKM and MODMGGAD) and the L2G Land products (MOD09GHK, MOD09GST, MOD14GD, MOD14GN, MOD11A1, MOD11A2, MOD10A1 and MOD10A2) covering the 8-day processing period. MODAPS runs PGE21 for each of the Land tiles configured in the data processing system. Products currently archived at MODAPS are the 8-day tiled granules of MOD09A1 and MOD09A1C. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD09A1 to the PDR Server for archive and distribution at the EDC DAAC.

MODAPS V2 Production

PGE21 runs in MODAPS V2 Recipe AM1M_L10, which is executed every 8 days upon the availability of the MODIS Land pointer files and geolocation angles (MODPTHKM and MODMGGAD) and the L2G Land products (MOD09GHK, MOD09GST, MOD14GD, MOD14GN, MOD11A1, MOD11A2, MOD10A1 and MOD10A2) covering the 8-day processing period. MODAPS runs PGE21 for each of the Land tiles configured in the data processing system. Products currently archived at MODAPS are the 8-day tiled granules of MOD09A1 and MOD09A1C. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD09A1 to the PDR Server for archive and distribution at the EDC DAAC.

Production Rules

PGE21 runs once for each of the L2G Land tiles over a period of eight days. The Period Start of 8 Days Production Rule will stage the daily L2G files. There are nominally 338 Land tiles. The operational scenario is 338 or less activations every eight days, representing the processing of one land tile per PGE run.

PGE21 requires the Latitude/Longitude Tiling Production Rule. To execute PGE21, a Latitude/Longitude tile definition file must be associated with the PGE at MODAPS. For each individual execution, MODAPS will create a recipe instance for a particular Tile ID and pass the information on the Tile ID back to the PGE as part of the input file names. Since PGE21 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Five tiling schemes were used to produce the input products of L2G surface reflectances. The tiling schemes are shown in Table 4-2. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. Since MODAPS combines tile schemes into one file, only one profile of PGE21 is required to handle all of the tiles.

However, PGE 21 has the capability of producing the 8-day Surface Reflectance product at three resolutions; 1km, 500m, and 250m. The required input data sets are matching granules of MOD09GHK, MOD09GQK, MOD09GST, MODPTHKM, MODPTQKM, and MODMGGAD. The current MODAPS operation needs only the matching MOD09GHK, MOD09GST, MODPTHKM, and MODMGGAD.

A runtime parameter is passed to PGE21 to indicate which product from PGE 21 is to be subsetted and written to the MOD_SS file. This runtime parameter contains the logical unit number for this product. A second runtime parameter contains the corresponding logical unit number for the output MOD_SS file. The version number for PGE21 is also passed into the PGE as a runtime parameter.

These Profiles are the following:

- Produce only the 250m products
- Produce only the 1km and 500m products
- Produce the 1km, 500m, and 250m products

The L2G Land Surface Reflectance products and their required pointers are only generated in day mode. However, the DayNightFlag may have a setting of "Day" or "Both" due to a setting of the DayNightFlag to "Day" or "Both" for the input L2 MOD09 granules to PGE13. Since the DayNightFlag for the L2G Land Surface Reflectance products is never set to "Night" and a DayNightFlag setting of "Day" and "Both" for L2G

inputs to PGE21 is required, no Metadata Query is required on these L2G input products. Matching sets of the daily L2G data files are required for each tile. PGE21 software will be responsible for matching daily L2G data from all of the required inputs for each day in the 8-day period. PGE21 will require a “Smart” Start of Year Production Rule at the end of each year.

The Production Rules for all of the profiles of PGE21 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files

Dynamic Product Input ESDT

MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m ISIN Grid (R) 1
MOD09GQK	MODIS/Terra Surface Reflectance Daily L2G Global 250m ISIN Grid (R) 1
MOD09GST	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km ISIN Grid (R) 1
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m ISIN Grid (R) 1
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m ISIN Grid (R) 1
MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km ISIN Grid Day (R) 1

Dynamic Product Output ESDT

MOD09A1	MODIS/Terra Surface Reflectance 8-Day L3 Global 500m ISIN Grid (A_M) (A_D) 1
MOD09A1C	MODIS/Terra Coarse Surface Reflectance 8-Day L3 Global 5km ISIN Grid (A_M) 1

MOD09Q1	MODIS/Terra Surface Reflectance 8-Day L3 Global 250m ISIN Grid (A _M) (A _D) 1
MOD09Q1C	MODIS/Terra Coarse Surface Reflectance 8-Day L3 Global 5km Grid (A _M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Surface Reflectance 8-Day L3 Global 500m ISIN Grid (File name contains "MOD_SS.MODO9A1" to identify the particular subsetting product. One file is produced per validation site. A maximum of 15 sites are allowed.) (I _M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Surface Reflectance 8-Day L3 Global 250m ISIN Grid (File name contains "MOD_SS.MODO9Q1" to identify the particular subsetting product. One file is produced per validation site. A maximum of 15 sites are allowed.) (I _M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 2
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Dynamic Runtime Parameters for Operations

Start date time	<Start time for data observations>
End date time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

SizeMBECSDDataGranule value	266
ReprocessingPlanned value	no further update anticipated
ReprocessingActual value	processed once
ParameterName value	MODO9A1
LocalVersionID	G
ParameterName value for the coarse product	MODO9A1C
Produce coarse product 1 = yes, 0=no	1
mod_prss_infile_luns	209251

mod_prss_outfile_luns
PGE21 Version

209254
<Version of PGE21 that appears in
the ciList delivered with the code>

Runtime Information for Operations

Tileid

<Tile identification number. For PGE21
the Tileid is part of the input file names
which are built by the PGE Scripts.>

4.22. Level 3 Daily Aggregation (PGE22)

PGE22 performs the L3 Daily Land Aggregation processing at MODAPS.

Purpose

PGE22 produces L3 Bi-directional Reflectance Distribution Function (BRDF) Preprocessing Database product (MODAGAGG) and the L3 BRDF Texture Database (MODAGTEX) at 1km resolution. It also produces the corresponding subsetting BRDF Preprocessing Texture Database and BRDF texture database products (MOD_SS), and the Land QA product (MODLM_QA).

Structure

PGE22 consists of the L3 Aggregation process (MOD_PRAGG) and the Land QA process (MOD_PRLQA). PGE22 also runs the Land shared MOD_PRSS.pl script to produce the subsetting product.

MODAPS V1 Production

PGE22 runs in MODAPS V1 Loader MDL5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE22 for each of the Land tiles configured in its Data Processing System upon the availability of the L2G Surface Reflectance granules (MOD09GHK and MOD09GST) from PGE13 and the L2G Pointers and Geoangles (MODPTHKM and MODMGGAD) from PGE12. Products archived at MODAPS are the daily MODAGAGG and MODAGTEX tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. No products from PGE22 are archived at the DAAC.

MODAPS V2 Production

PGE22 runs in MODAPS V2 Recipe AM1M_L5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE22 for each of the Land tiles configured in its Data Processing System upon the availability of the L2G Surface Reflectance granules (MOD09GHK and MOD09GST) from PGE13 and the L2G Pointers and Geoangles (MODPTHKM and MODMGGAD) from PGE12. Products archived at MODAPS are the daily MODAGAGG and MODAGTEX tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. No products from PGE22 are archived at the DAAC.

Production Rules

PGE22 runs daily for each of the 338 Land tiles. For a reduced production scenario there will be fewer land tiles generated. The operational scenario is at maximum 338 activations per day, representing the processing of one land tile per PGE execution. The Period Specification Production Rule will be used to stage the daily L2G files.

PGE22 requires the Latitude/Longitude Tiling Production Rule. To execute PGE22, a Latitude/Longitude tile definition file must be associated with the PGE. For each individual execution, MODAPS will create a recipe instance for a particular Tile ID. Since PGE22 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Five tiling schemes were used to produce the input products of L2G Surface Reflectance. The tiling schemes are shown in Table 4-2. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. Since MODAPS combines the tile schemes into one file, only one profile of PGE22 is required.

The required input data sets are matching granules of MOD09GHK, MOD09GQK, MOD09GST, MODPTHKM, MODPTQKM and MODMGGAD. L2G Geoangles (MODMGGAD) are already generated separately in day mode. The L2G Land Surface Reflectance products and their required pointers are only generated in day mode. Thus, no Metadata Query is required on these input products. Matching sets of the daily L2G data files are required for each tile. PGE22 software will be responsible for matching granules of L2G data from all of the required inputs for the day.

A runtime parameter is passed into PGE22 to include which products from PGE23 are to be subsetting and written to each of the MOD_SS files. This runtime parameter contains the list of logical unit numbers for these products. A second runtime parameter contains the list of corresponding logical unit numbers for the output MOD_SS files. The version number for PGE22 is also passed into the PGE as a runtime parameter.

The Production Rules for PGE22 are:

- Period Specification,
- Latitude/Longitude Tiling
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files

Dynamic Product Input ESDT

MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m ISIN Grid (R) 1
MOD09GQK	MODIS/Terra Surface Reflectance Daily L2G Global 250m ISIN Grid (R) 1
MOD09GST	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km ISIN Grid (R) 1
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m ISIN Grid (R) 1
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m ISIN Grid (R) 1
MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km ISIN Grid Day (R) 1

Dynamic Product Output ESDT

MODAGAGG	MODIS/Terra BRDF Preprocessing Database Daily L3 Global 1km ISIN Grid (A_M) 1
MODAGTEX	MODIS/Terra BRDF Texture Database Daily L3 Global 1km ISIN Grid (A_M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: BRDF Preprocessing Database Daily L3 Global 1km ISIN Grid (Filename contains MOD_SS.MODAGAGG to identify the particular subsetted product. One file is produced per validation site.) (I_M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: BRDF Texture Database Daily L3 Global 1km ISIN Grid (Filename contains MOD_SS.MODAGTEX to identify the particulars subsetted product. One file is produced per validation site.) (I_M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA MODIS/Terra Land Quality Assurance (I_M) 2

Dynamic Runtime Parameters for Operations

SatelliteInstrument <Spacecraft platform for MODIS
 Instrumentsupplied by MODAPS. Value =
 {AM1M, PM1M}>

Static Runtime Parameters for Operations

SizeMBECSDataGranule value	183
ReprocessingPlanned value	no further update anticipated
ReprocessingActual value	processed once
ParameterName value	Surface_Refl
mod_prss_infile_luns	297100,297101
mod_prss_outfile_luns	297102,297103
PGE22 Version	<Version of PGE22 that appears In the ciList delivered with the code>

4.23. Level 3 16-Day Bi-Directional Reflectance Distribution Function/BARS (PGE23)

PGE23 performs the L3 16-Day Bi-directional Reflectance Distribution Function (BRDF)/BARS processing at MODAPS.

Purpose

PGE23 produces BRDF, Albedo, and Adjusted Nadir Reflectance products (MOD43B1, MOD43B2, MOD43B3, and MOD43B4), the corresponding coarse (5km) products (MOD43B1C, MOD43B3C, and MOD43B4C) the Land QA product (MODLM_QA), and Subsetted MOD43B1, MOD43B2, MOD43B3, and MOD43B4 products (MOD_SS).

Structure

PGE23 consists of the BRDF Albedo process (MOD_PR43B) and the Land QA process (MOD_PRLQA). PGE 23 also runs the Land shared MOD_PRSS.pl Script to produce the subsetted product.

MODAPS V1 Production

PGE23 runs in MODAPS V1 Loader MDL12, which is executed every 16 days upon the availability of all of the expected daily granules of MODAGAGG covering the 16-day processing period. MODAPS runs PGE23 for each of the Land tiles configured in the data processing system. Products archived at MODAPS are the 16-Day MOD43B1, MOD43B2, MOD43B3, and MOD43B4 tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD43B1, MOD43B2, MOD43B3, and MOD43B4 to the PDR Server for archive and distribution at the EDC DAAC.

MODAPS V2 Production

PGE23 runs in MODAPS V2 Recipe AM1M_L12, which is executed every 16 days upon the availability of all of the expected daily granules of MODAGAGG covering the 16-day processing period. MODAPS runs PGE23 for each of the Land tiles configured in the data processing system. Products archived at MODAPS are the 16-Day MOD43B1, MOD43B2, MOD43B3, and MOD43B4 tiled granules. MODAPS Interim products are MOD43B1C, MOD43B3C, MOD43B4C, MOD_SS and MODLM_QA. MODAPS exports MOD43B1, MOD43B2, MOD43B3, and MOD43B4 to the PDR Server for archive and distribution at the EDC DAAC.

Production Rules

PGE23 runs after 16 days of L3 Daily Aggregation (PGE22) processing has completed for a tile. The operational scenario is nominally 338 activations every 16 days, representing the processing of one Land tile per PGE run. PGE 23 requires the Period Start of 16 Days Production rule to acquire the correct 16 daily BRDF database granules for the tile being processed. PGE23 will require a “Smart” Start of Year Production Rule at the end of each year.

PGE23 requires the Latitude/Longitude Tiling Production Rule. To execute PGE23, a Latitude/Longitude tile definition file must be associated with the PGE. For each individual execution, MODAPS will create a recipe instance for a particular Tile ID. Since PGE23 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Five tiling schemes were used to produce the input products of MODAGAGG. These five tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Surface Reflectance products. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. Since MODAPS combines the tile schemes into one file, only one profile of PGE23 is required.

The required input data set is MODAGAGG which has been generated only in day mode. Thus, the output products are produced only in day mode.

A runtime parameter is passed into PGE23 to indicate which products from PGE23 are to be subsetted and written to each of the MOD_SS files. This runtime parameter contains the list of logical unit numbers for these products. A second runtime parameter contains the list of corresponding logical unit numbers for the output MOD_SS files. The Version number for PGE23 is also passed into the PGE as a runtime parameter.

The Production Rules for PGE23 are:

- Period Start of 16 Days,
- “Smart” Start of Year,
- Latitude/Longitude Tiling
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files**Static Input ESDT**

MOD43LUA	MODIS/Terra BRDF Surface Albedo LUT for Production of MOD43
MOD43LUP	MODIS/Terra BRDF Set-up Table Database for Production of MOD43
MOD43LUT	MODIS/Terra BRDF Code and Model Set-up Table for MOD43 Products

Dynamic Product Input ESDT

MODAGAGG	MODIS/Terra BRDF Preprocessing Database Daily L3 Global 1km ISIN Grid (R) 1
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Dynamic Product Output ESDT

MOD43B1	MODIS/Terra BRDF/Albedo Model-1 16-Day L3 Global 1km ISIN Grid (A_M) (A_D) 1
MOD43B1C	MODIS/Terra Coarse BRDF/Albedo Model-1 16-Day L3 Global 5km ISIN Grid (I_M) 1
MOD43B2	MODIS/Terra BRDF/Albedo Model-2 16-Day L3 Global 1km ISIN Grid (A_M) (A_D) 1
MOD43B3	MODIS/Terra Albedo 16-Day L3 Global 1km ISIN Grid (A_M) (A_D) 1
MOD43B3C	MODIS/Terra Coarse Albedo 16-Day L3 Global 5km ISIN Grid (I_M) 1
MOD43B4	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 1km ISIN Grid (A_M) (A_D) 1
MOD43B4C	MODIS/Terra Coarse Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 5km ISIN Grid (I_M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: BRDF/Albedo Model-1 16-Day L3 Global 1km ISIN

	Grid (File name contains MOD_SS.MOD43B1 to identify the particular subsetted product. One file is produced per validation site.) (I _M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Empirical BRDF/Albedo Model-2 16-Day L3 Global 1km ISIN Grid (File name contains MOD_SS.MOD43B2 to identify the particular subsetted product. One file is produced per validation site.) (I _M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Minimal Albedo 16-Day L3 Global 1km ISIN Grid (File name contains MOD_SS.MOD43B3 to identify the particular subsetted product. One file is produced per validation site.) (I _M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 1km ISIN Grid (File name contains MOD_SS.MOD43B4 to identify the particular subsetted product. One file is produced per validation site.) (I _M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 8
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
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Static Runtime Parameters for Operations

mod_prss_infile_luns	243200, 243201, 243220, 243230
mod_prss_outfile_luns	243202, 243203, 243221, 243231
PGE23 Version	<Version of PGE23 that appears in the ciList delivered with the code>

4.24. Level 3 16-Day Bi-Directional Reflectance Distribution Function/Albedo CMG (PGE24)

PGE24 performs the L3 16-day CMG Bi-directional Distribution Function (BRDF)/Albedo Processing at MODAPS.

Purpose

PGE24 produces the 16-day CMG BRDF/Albedo product (MOD43C1) and the Land QA product (MODLM_QA).

Structure

PGE24 consists of the CMG BRDF/Albedo 16-day process (MOD_PR43C) and the Land QA processes (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE 24.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE 24.

Production Rules

PGE24 runs after all 338 of the tiles of the 16-day L3 BRDF/BARS products (PGE23) have been processed. The Period Start of 16 Days Production Rule is specified for production. PGE24 will require a “Smart” Start of Year Production Rule at the end of each year.

The required input products are MOD43B1 and MOD43B2. The BRDF 16-day input data granules were generated only in day mode. Thus, the output product MOD43C1 is produced only in day mode. The gridded MOD43C1 product is generated from all of the available 16-day MOD43B1 and MOD43B2 tiles. A Minimum Number of Granules, representing the number of 16 day tiles, is specified for each input product type and a time-out is associated for running PGE24 if the minimum requirements are met.

The Production Rules for PGE24 are:

- Period Start of 16 Days,
- “Smart” Start of Year,
- Minimum Number of Granules.

Data Files**Dynamic Product Input ESDT**

MOD43B1	MODIS/Terra BRDF/Albedo Model-1 16-Day L3 Global 1km ISIN Grid (R)*
MOD43B2	MODIS/Terra BRDF/Albedo Model-2 16-Day L3 Global 1km ISIN Grid (R)*

Dynamic Product Output ESDT

MOD43C1	MODIS/Terra BRDF/Albedo 16-Day L3 Global 28km CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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*The MODIS Science Team has not delivered PGE24; the minimum number of files required for production is unavailable.

4.25. Level 3 16-Day Vegetation Indices 250 m and 500 m (PGE 25)

PGE25 is the L3 16-day (500m and 250m) Vegetation Indices process at MODAPS.

Purpose

PGE25 produces the 16-day gridded Vegetation Indices 500m product (MOD13A1), the corresponding 250m product (MOD13Q1), the coarse resolution product (5km) (MOD13A1C) the Land QA product (MODLM_QA), and subsetting MOD13A1 and MOD13Q1 products (MOD_SS).

Structure

PGE25 consists of the 16-day gridded Vegetation Indices (500m 250m) process (MOD_PR13A1) and the Land QA process (MOD_PRLQA). PGE 25 also runs the Land Shared MOD_PRS.pl Script to produce the subsetting products.

MODAPS V1 Production

PGE25 runs in MODAPS V1 Loader MDL12, which is executed every 16 days upon the availability of all of the expected L2G daily granules of surface reflectance and corresponding pointer files and geolocation angles (MOD09GHK, MOD09GQK, MOD09GST, MODPTHKM, MODPTQKM and MODMGGAD), covering the 16-day processing period. MODAPS runs two profiles of PGE25 for each of the Land tiles configured in the data processing system. The first profile produces the 500m product (MOD13A1) and the second profile produces the 250m product (MOD13Q1). Products archived at MODAPS are granules of MOD13A1 and MOD13Q1. MODAPS Interim products are MOD13A1C, MOD_SS and MODLM_QA. MODAPS exports MOD13A1 and MOD13Q1 to the PDR Server for archive and distribution at the EDC DAAC.

MODAPS V2 Production

PGE25 runs in MODAPS V2 Recipe AM1M_L12, which is executed every 16 days upon the availability of all of the expected L2G daily granules of surface reflectance and corresponding pointer files and geolocation angles (MOD09GHK, MOD09GQK, MOD09GST, MODPTHKM, MODPTQKM and MODMGGAD), covering the 16-day processing period. MODAPS runs two profiles of PGE25 for each of the Land tiles configured in the data processing system. The first profile produces the 500m product (MOD13A1) and the second profile produces the 250m product (MOD13Q1). Products archived at MODAPS are granules of MOD13A1 and MOD13Q1. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD13A1 and MOD13Q1 to the PDR Server for archive and distribution at the EDC DAAC.

Production Rules

PGE25 runs after 16 days of L2G Daily Land Surface Reflectance/Fire (PGE13) output has been generated. The operational scenario is nominally 338 activations per 16-days, representing the processing of one Land gridded tile per run. The generation of MOD13Q1 is currently limited to about 10% of the Land tiles due to limited processing and archive space. Future plans allow for processing all of the Land tiles for this 250m product. The Period Start of 16 Days Production Rule is specified for production. PGE25 will require a “Smart” Start of Year Production Rule at the end of each year.

PGE25 requires the Latitude/Longitude Tiling Production Rule. To execute PGE25, a Latitude/Longitude tile definition file must be associated with the PGE. For each individual execution, MODAPS will create a recipe instance for a particular Tile ID. Since PGE25 now obtains the TileID from the input product, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Five tiling schemes shown in Table 4-2 were used to produce the input tiled products of L2G Surface Reflectance. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. MODAPS combines all of these tile schemes into one file for the 500m processing. A Selection of priority tiles is used for the 250m processing. Two profiles of PGE25 are required, one for the 500m processing and one for the 250m processing.

The required input products MOD09GQK, MOD09GHK, MOD09GST, MODPTHKM, MODPTQKM, and MODMGGAD are only produced in day mode. MODAPS activates PGE25 if all 16 days of the L2G surface reflectance, pointers, and geoangles are available or 21 days from the availability of the first L2G inputs if one or more of the 16 days of input files are missing. The MOD_SS subsetting products are produced for the Land validation sites. A maximum of 15 different subsetting granules of each ESDT are allowed, one for each validation site.

Runtime parameters are passed to PGE25 to indicate that the MOD13A1 and MOD13Q1 products are to be subsetting and written to the MOD_SS files. These runtime parameters contain the logical unit numbers for the products. A second set of runtime parameters contains the corresponding logical unit numbers for the output MOD_SS files. The version number for PGE 25 is also passed to the PGE as a runtime parameter.

The Production Rules for PGE25 are:

- Period Start of 16 Days,

- “Smart” Start of Year,
- Latitude/Longitude Tiling
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files

Dynamic Product Input ESDT

MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m ISIN Grid (R) 1
MOD09GQK	MODIS/Terra Surface Reflectance Daily L2G Global 250m ISIN Grid (R) 1
MOD09GST	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km ISIN Grid (R) 1
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m ISIN Grid (R) 1
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m ISIN Grid (R) 1
MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km ISIN Grid Day (R) 1

Dynamic Product Output ESDT

MOD13A1	MODIS/Terra Vegetation Indices 16-Day L3 Global 500m ISIN Grid (A _M) (A _D) 1
MOD13A1C	MODIS/Terra Coarse Vegetation Indices 16-Day L3 Global 5km ISIN Grid (I _M) 1
MOD13Q1	MODIS/Terra Vegetation Indices 16-Day L3 Global 250m ISIN Grid (A _M) (A _D) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Vegetation Indices 16-Day L3 Global 250m ISIN Grid (Filename contains MOD_SS.MOD13Q1 to identify the particular subsetting product. One file is produced per validation site.) (I _M) 15

MOD_SS MODIS/Terra Land Subsetting QA Files: Vegetation Indices 16-Day L3 Global 500m ISIN Grid (Filename contains MOD_SS.MOD13A1 to identify the particular subsetting product. One file is produced per validation site.) (I_M) 15

Quality Control or Diagnostic Output ESDT

MODLM_QA MODIS/Terra Land Quality Assurance (I_M) 2

Dynamic Runtime Parameters for Operations

Start date time <Start time for data observations>

End date time <End time for data observations>

SatelliteInstrument <Spacecraft platform for MODIS
Instrument supplied by MODAPS.
Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations*

REPROCESSINGACTUAL metadata field	processed once
REPROCESSINGPLANNED metadata field	further update is anticipated
product version number	<ESDT Collection VersionID for product produced in this PGE version, e.g., 3.)
BRDFFalg;1=Perform BRDF, 0=Disable BRDF	0
CVMVCFalg;1=Perform CVMVC, 0=Disable CVMVC	1
BRDF Data base file name	None
MinBRDFNumberOfObservations	5
MinBRDFNDVI	-0.3
ExtraMaxBRDFNDVI	0.05
MinCVMVCNumberOfObservations	2
MinCVMVCNVI	-0.3
ExtraMaxCVMVCNDVI	0.05
mod_prss_infile_luns	213100
mod_prss_outfile_luns	2131101
PGE25 Version	<Version of PGE25 that appears in the ciList delivered with the code>

*Currently runtime parameters are set to the same values for both profiles of PGE25.

4.26. Level 3 Monthly Vegetation Indices 1km (PGE26)

PGE26 performs the L3 monthly Vegetation Indices processing.

Purpose

PGE26 produces the L3 gridded Vegetation Indices product (MOD13A3) and the Land QA product (MODLM_QA).

Structure

PGE26 consists of the L3 Vegetation Indices process (MOD_PR13A3) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

PGE26 runs in MODAPS V1 Loader MDL14C, which is executed once every calendar month upon the availability of 16-Day vegetation indices products. MODAPS runs PGE26 for each of the Land tiles configured in the Data Processing System. Products archived at MODAPS are the monthly MOD13A3 tiled granules. MODAPS Interim products are MODLM_QA files. MODAPS exports MOD13A3 to the PDR Server for archive and distribution at the EDC DAAC.

MODAPS V2 Production

PGE26 runs in MODAPS V2 Recipe AM1M_L14c, which is executed once every calendar month upon the availability of 16-Day vegetation indices products. MODAPS runs PGE26 for each of the Land tiles configured in the Data Processing System. Products archived at MODAPS are the monthly MOD13A3 tiled granules. MODAPS Interim products are MODLM_QA files. MODAPS exports MOD13A3 to the PDR Server for archive and distribution at the EDC DAAC.

Production Rules

PGE26 runs after one month of the 16-Day gridded Vegetation Indices (PGE35) output has been produced. The operational scenario is nominally 338 activations per calendar month, representing the processing of one Land gridded tile per PGE run. Due to restrictions on the percent of data products to be produced, the actual number of tiles included for PGE26 may be less than 338. The Period Specification Production Rule is specified for PGE32.

PGE26 requires the Latitude/Longitude Tiling Production Rule. To execute PGE26, a Latitude/Longitude tile definition file must be associated with the PGE. Since PGE26 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Five tiling schemes were used to produce the input product MOD13A2. These five tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Surface Reflectance products. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. Since MODAPS combines the tile schemes into one file, only one profile of PGE26 is required.

The required input products are the 16-day granules of MOD13A2 that overlap the calendar month. The input products have been generated only in day mode. Thus, the output MOD13A3 product is produced only in day mode.

The Production Rules for PGE26 are:

- Period Specification
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files

Dynamic Product Input ESDT

MOD13A2	MODIS/Terra Vegetation Indices 16-Day L3 Global 1km ISIN Grid (R) 1
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Dynamic Product Output ESDT

MOD13A3	MODIS/Terra Vegetation Indices Monthly L3 Global 1km ISIN Grid (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

Start date time	<Start time for data observations>
End date time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied

by MODAPS Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL

processed once

REPROCESSINGPLANNED

further update is anticipated

Product version number

<ESDT Collection VersionID for
product produced by this PGE version,
e.g., 3.>

PGE26 Version

<Version of PGE26 that appears in the
ciList delivered with the code>

4.27. Level 3 16-Day Vegetation Indices CMG (PGE27)

PGE27 performs the L3 16-day CMG Vegetation Indices processing at MODAPS.

Purpose

PGE27 produces the 16-day CMG Vegetation Indices product at 28 km resolution (MOD13C2) and the Land QA product (MODLM_QA).

Structure

PGE27 consists of the 16-day gridded Vegetation Indices process (MOD_PR13C2) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE27.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE27.

Production Rules

PGE27 runs after 16 days of L3 gridded Vegetation Indices (PGE35) processing has completed for all tiles for the 16-day period. The operational scenario is nominally one activation every 16-days. The Period Start of 16 Days Production Rule is required for PGE27. PGE27 will require a “Smart” Start of Year Production Rule at the end of each year.

The required input is MOD13A2, which has been generated only in day mode. Thus, the output product is produced only in day mode. The gridded MOD13C2 product is generated from all of the available 16-day tiles of MOD13A2. A Minimum Number of Granules, representing the number of 16-day tiles, is specified for MOD13A2 and a time-out is associated for running PGE27 if the minimum requirements are met.

The Production Rules for PGE27 are:

- Period Start of 16 Days,
- “Smart” Start of Year,
- Minimum Number of Granules.

Data Files**Dynamic Product Input ESDT**

MOD13A2	MODIS/Terra Vegetation Indices 16-Day L3 Global 1km ISIN Grid (R) *
---------	--

Dynamic Product Output ESDT

MOD13C2	MODIS/Terra Vegetation Indices 16-Day L3 Global 28km CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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*The MODIS Science Team has not delivered PGE27; the minimum number of files required for production is unavailable.

4.28. Level 3 Monthly Vegetation Indices CMG (PGE28)

PGE28 performs the L3 monthly CMG Vegetation Indices processing at MODAPS.

Purpose

PGE28 produces the monthly CMG Vegetation Indices product at 28 km resolution (MOD13C3) and the Land QA product (MODLM_QA).

Structure

PGE28 consists of the monthly CMG Vegetation Indices process (MOD_PR13C3) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE28.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE28.

Production Rules

PGE28 runs after one month of L3 Vegetation Indices Monthly (PGE26) output has been processed. The operational scenario is nominally one activation every calendar month. The Period Specification Production Rule is required for PGE28.

The required input is MOD13A3. The gridded MOD13C3 product is generated from all of the available monthly tiles of MOD13A3, which has been generated only in day mode. Thus, the output product is produced only in day mode. A Minimum Number of Granules, representing the number of monthly tiles, is specified for MOD13A3 and a time-out is associated for running PGE28 if the minimum requirements are met.

The Production Rules for PGE28 are:

- Period Specification
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD13A3	MODIS/Terra Vegetation Indices Monthly L3 Global 1km ISIN Grid (R) *
---------	---

Dynamic Product Output ESDT

MOD13C3	MODIS/Terra Vegetation Indices Monthly L3 Global 28km CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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*The MODIS Science Team has not delivered PGE28; the minimum number of files required for production is unavailable.

4.29. Level 3 Daily and 8-Day Thermal Anomalies/Fire (PGE29)

PGE29 performs the L3 daily and 8-day Thermal Anomalies/Fire processing at MODAPS.

Purpose

PGE29 produces the L3 daily and 8-day gridded Thermal Anomalies/Fire products (MOD14A1 and MOD14A2), the Land QA product (MODLM_QA), and the subsetted MOD14A1 and MOD14A2 products (MOD_SS)

Structure

PGE29 consists of the composite Thermal Anomalies process (MOD_PR14A) and the Land QA process (MOD_PRLQA). PGE29 also runs the Land Shared MOD_PRSS pl. script to produce the subsetted products.

MODAPS V1 Production

PGE29 runs in MODAPS V1 Loader MDL10, which is executed every 8 days upon the availability of all of the expected L2G granules of land products covering the 8-Day processing period. MODAPS runs PGE29 for each of the Land tiles configured in the data processing system upon the availability of MOD14GD and MOD14GN. Products archived at MODAPS are the daily MOD14A1 and 8-day MOD14A2 tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD14A1 and MOD14A2 to the PDR Server for archive and distribution at the EDC DAAC.

MODAPS V2 Production

PGE29 runs in MODAPS V2 Recipe AM1M_L10, which is executed every 8 days upon the availability of all of the expected L2G granules of land products covering the 8-Day processing period. MODAPS runs PGE29 for each of the Land tiles configured in the data processing system upon the availability of MOD14GD and MOD14GN. Products archived at MODAPS are the daily MOD14A1 and 8-day MOD14A2 tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD14A1 and MOD14A2 to the PDR Server for archive and distribution at the EDC DAAC.

Production Rules

PGE29 runs after eight days of L2G Thermal Anomalies/Fire (PGE13) processing has completed. The operational scenario is nominally 338 activations every 8-days, representing the processing of one Land tile per PGE execution. Each PGE run produces the MOD14A2 8-day composite product granule and one MOD14A1 product granule containing 8 daily collections corresponding to the number of input L2G granules. One dimension in the 3-D SDS in MOD14A1 corresponds to the day in the 8-day cycle. The Period Start of 8 Days Production Rule is required for PGE29. PGE29 will require a “Smart” Start of Year Production Rule at the end of each year.

PGE29 requires the Latitude/Longitude Tiling Production Rule. To execute PGE29, a Latitude/Longitude tile definition file must be associated with the PGE. For each individual execution, MODAPS will create a recipe instance with a particular Tile ID and pass the Tile ID back to the PGE. Since PGE29 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Five tiling schemes shown in Table 4-2 were used to produce the input products of L2G Thermal Anomalies/Fire (MOD14GD and MOD14GN). All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. Since MODAPS combines the tile schemes into one file, only one profile of PGE29 is required.

The required inputs are MOD14GD and MOD14GN since the day mode and night mode data are to be processed together. Day and night mode products are contained in the same MOD14A1 and MOD14A2 output files.

Several Runtime Parameters must be set in the PCF. The dynamic runtime parameters to be set by MODAPS are the start and end date time for the data observations and the SatelliteInstrument that identifies the Spacecraft platform for the MODIS Instrument as either AM-1 or PM-1. Some of the Static runtime parameters are ReprocessingActual, ReprocessingPlanned, product version number, and PGE version number

The Production Rules for PGE29 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Metadata Based Query,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files

Dynamic Product Input ESDT

MOD14GD	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km ISIN Grid Day (R) 1*
MOD14GN	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km ISIN Grid Night (R) 1*

Dynamic Product Output ESDT

MOD14A1	MODIS/Terra Thermal Anomalies/Fire Daily L3 Global 1km ISIN Grid (A_M) A_D 1
MOD14A2	MODIS/Terra Thermal Anomalies/Fire 8-Day L3 Global 1km ISIN Grid (A_M) A_D 1
MOD_SS	MODIS/Terra Land Subsetting QA Files; Thermal Anomalies/Fire Daily L3 Global 1km ISIN Grid (File names contain MOD_SS.MOD14A1 to identify the particular subsetted product. One file is produced per validation site.) (I_M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files; Thermal Anomalies/Fire 8-Day L3 Global 1km ISIN Grid (Filename contains MOD_SS.MOD14A2 to identify the particular subsetted product. One file is produced per validation site.) (I_M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I_M) 2
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*Either 1 granule of MOD14GD or MOD14GN is required.

Dynamic Runtime Parameters for Operations

start date time	<Start time for data observations>
end date time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL metadata field
REPROCESINGPLANNED metadata field
product version number

mod_prss_infile-luns
mod-prss_outfile-luns
PGE29 Version

processed once
further update is anticipated
<ESDT Collection VersionID for
product produced in this PGE version,
e.g., 3.>
214001, 214002
214003, 214004
<Version of PGE29 that appears in the
ciList delivered with the code>

4.30. Level 2 Thermal Anomalies/Fire (PGE30)

PGE30 performs processing for L2 Land Thermal Anomalies/Fire at MODAPS.

Purpose

PGE30 produces Land L2 Thermal Anomalies/Fire (MOD14), the corresponding coarse resolution product (MOD14CS) and the Land QA product (MODLM_QA).

Structure

PGE30 consists of two processes: MOD_PR14 and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The Thermal Anomalies/Fire product (MOD14) was produced by PGE11 along with the Surface Reflectance product (MOD09) in MODAPS V1. During the transition to MODAPS V2, PGE11 was split into PGE11 and PGE30. PGE11 still produces the Surface Reflectance products and PGE30 produces the Thermal Anomalies/Fire product.

PGE11 runs in MODAPS Loader MDL3, which is executed once every orbit upon the availability of one or more of the L1B products (MOD021KM, MOD02HKM, and MOD02QKM) for the orbital period. Products archived at MODAPS are a set of 5-minute granules, one per PGE run, of each of the following data types covering the orbital period: MOD09 and MOD14. MODAPS exports MOD14 to the PDR Server for archive and distribution at the EDC DAAC. MODAPS Interim products for the same period are granules of MOD09CRS, granules of MOD02CRS, and granules of MODLM_QA.

MODAPS V2 Production

PGE30 runs in MODAPS V2 Recipe AM1M_L1, which is executed once every two hours upon the availability of Geolocation Fields (MOD03) and L1B at 1 km (MOD021KM). Products archived at MODAPS are 24 5-minute granules of MOD14, one per PGE run. MODAPS exports MOD14 to the PDR Server for archive and distribution at the EDC DAAC. MODAPS Interim products for the same period are 24 granules of MOD14CRS and MODLM_QA.

Production Rules

PGE30 runs every two hours after the Geolocation Fields and L1B products arrive from the GSFC DAAC. PGE30 can be run if at least one set of 5-minute input granules are available. For every temporally-matched set of input granules, PGE30 will output one 5-minute granule of MOD14. After a time-out period for the required input to become available at MODAPS, PGE30 will run using the available sets of input granules with a minimum of one granule of each.

PGE 30 makes use of the SatelliteInstrument dynamic runtime parameter from MODAPS. This parameter indicates the spacecraft platform for the MODIS Instrument. The value is either "AM1M" or "PM1M".

The Production Rules for PGE11 are:

- Basic Temporal
- Minimum Number of Granules
- Runtime Parameters

Data Files

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1

Dynamic Product Output ESDT

MOD14	MODIS/Terra Thermal Anomalies/Fire 5-Min L2 Swath 1km (A _M) (A _D) 1
MOD14CRS	MODIS/Terra Coarse Thermal Anomalies/Fire 5-Min L2 Swath 5km (A _M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

Satellite Instrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
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Static Runtime Parameters for Operations

REPROCESSINGACTUAL metadata field	processed once
REPROCESSINGPLANNED metadata field	further update is anticipated
product version number	<Value of collection version; current version = 3>
force internal cloud mask for fire 1=yes 0=no	1
PGE30 version	<version of PGE30 that appears in the ciList delivered with the code>

4.31. Level 3 8-Day Land Surface Temperature (PGE31)

PGE31 performs the L3 8-day Land Surface Temperature (LST) processing at MODAPS.

Purpose

PGE31 produces gridded 8-day LST/Emissivity product (MOD11A2) and the Land QA product (MODLM_QA).

Structure

PGE31 consists of the L3 LST 8-day process (MOD_PR11A) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

PGE31 runs in MODAPS V1 Loader MDL10, which is executed once every 8 days upon the availability of L2G and L3 daily Land products for the 8-day processing period. MODAPS runs PGE31 for each of the Land tiles configured in the data processing system upon the availability of MOD11A1 daily products for the 8 days in the processing period. Products archived at MODAPS are the 8-Day MOD11A2 tiled granules. MODAPS Interim products are granules of MODLM_QA. MODAPS exports MOD11A2 to the PDR Server for archive and distribution at the EDC DAAC.

MODAPS V2 Production

PGE31 runs in MODAPS V2 Recipe AM1M_L10, which is executed once every 8 days upon the availability of L2G and L3 daily Land products for the 8-day processing period. MODAPS runs PGE31 for each of the Land tiles configured in the data processing system upon the availability of MOD11A1 daily products for the 8 days in the processing period. Products archived at MODAPS are the 8-Day MOD11A2 tiled granules. MODAPS Interim products are granules of MODLM_QA. MODAPS exports MOD11A2 to the PDR Server for archive and distribution at the EDC DAAC.

Production Rules

PGE31 runs after 8 days of L2/L3 Land Surface Temperature (PGE16) processing has been completed. The operational scenario is at maximum 338 activations every eight days, representing the processing of one land tile per PGE execution. For this version of PGE31, the nominal number of activations is 326 every eight days. The Period Start of 8 Days Production Rule is required for PGE31. PGE31 will require a "Smart" Start of Year Production Rule at the end of each year.

PGE31 requires the Latitude/Longitude Tiling Production Rule. To execute PGE31, a Latitude/Longitude tile definition file must be associated with the PGE. For each individual execution, MODAPS will create a recipe instance for a particular Tile ID. Since PGE31 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

The MOD11A1 input product to PGE31 has been generated by PGE16 as a tiled product for which the tiles correspond to other Land products. PGE16 produced its tiled granules according to its internal tiling scheme. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one.

Five tiling schemes shown in Table 4-2 were used to produce most of the other Land input products, such as L2G Land Surface Reflectance products, corresponding to LST. Since MODAPS combines the tile schemes into one file, only one profile of PGE31 is required.

The MOD11A1 input product is required. This product is generated with a mixture of day mode and night mode data. Thus, the output MOD11A2 product will have the day and night modes mixed in the tiles.

The Production Rules for PGE31 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files

Dynamic Product Input ESDT

MOD11A1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 1km ISIN Grid (R) 1
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Dynamic Product Output ESDT

MOD11A2	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 1km ISIN Grid (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameter for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
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Static Runtime Parameter for Operations

PGE31 Version	<Version of PGE31 that appears in the ciList delivered with the code>
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4.32. Level 3 Daily Land Surface Temperature CMG (PGE32)

PGE32 performs the L3 daily CMG Land Surface Temperature processing at MODAPS.

Purpose

PGE32 produces CMG daily LST/Emissivity product (MOD11C1) and the Land QA product (MODLM_QA).

Structure

PGE32 consists of the Level 3 CMG LST daily process (MOD_PR11C) and the Land QA process (MOD_PRLQA).

MODAPS VI Production

The MODIS Science Team has not yet delivered PGE32.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE32.

Production Rules

PGE32 runs after one day of gridded daily Land Surface Temperature/Emissivity (PGE16) output has been produced. The operational scenario is nominally one activation per tile per day. The Period Specification Production Rule is required for PGE32. The required inputs are MOD11A1 and MOD11B1. The gridded MOD11C1 product is generated from all of the available 338 tiles of gridded daily LST at 1km and 5km resolution. A Minimum Number of Granules, representing the number of daily tiles, is specified for MOD11A1 and MOD11B1 and a time-out is associated for running PGE32 if the minimum requirements are met.

The Production Rules for PGE32 are:

- •Period Specification,
- •Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD11A1	MODIS/Terra Land Surface Temperature/ Emissivity Daily L3 Global 1km ISIN Grid (R) *
MOD11B1	MODIS/Terra Land Surface Temperature/ Emissivity Daily L3 Global 5km ISIN Grid (R) *

Dynamic Product Output ESDT

MOD11C1	MODIS/Terra Land Surface Temperature/ Emissivity			
	Daily L3 Global 56 km CMG	(A _M)	(A _D)	1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance	(I _M)		1
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* MODIS Science Team has not yet delivered PAGE32; the minimum number of files required for production is unavailable.

4.33. Level 4 Daily Leaf Area Index/FPAR (PGE33)

PGE33 performs the L4 daily Leaf Area Index (LAI) /FPAR processing at MODAPS.

Purpose

PGE33 produces the L4 daily Leaf Area Index/FPAR product (MOD15A1) the corresponding 5km browse product (MOD15A1C), the subsetting MOD15A1 products (MOD_SS), and the corresponding Land QA product (MODLM_QA).

Structure

PGE33 consists of the L4 daily gridded LAI/FPAR process (MOD_PR15A1) and the Land QA process (MOD_PRLQA). PGE33 also runs the Land shared MOD_PRSS.pl Script to produce the subsetting products.

MODAPS V1 Production

PGE33 runs in MODAPS V1 Loader MDL5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE 33 for each of the Land tiles configured in the Data Processing System after the MODAGAGG is produced in this Loader by PGE22. MOD12Q1, the quarterly Land Cover Type file, must also be staged for PGE33. Products archived at MODAPS are the daily MOD15A1 tiled granules. MODAPS Interim products are MOD15A1C, MOD_SS, and MODLM_QA. MODAPS exports MOD15A1 to the PDR Server for archive and distribution at the EDC DAAC.

MODAPS V2 Production

PGE33 runs in MODAPS V2 Recipe AM1M_L5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE 33 for each of the Land tiles configured in the Data Processing System after the MODAGAGG is produced in this Loader by PGE22. MOD12Q1, the quarterly Land Cover Type file, must also be staged for PGE33. Products archived at MODAPS are the daily MOD15A1 tiled granules. MODAPS Interim products are MOD15A1C, MOD_SS, and MODLM_QA. MODAPS exports MOD15A1 to the PDR Server for archive and distribution at the EDC DAAC.

Production Rules

PGE33 runs after the daily L3 Aggregation (PGE22) outputs are completed. The operational scenario is nominally 338 activations per day, representing the processing of one land tile per PGE execution. However, due to disk space allocations for priority

products, the actual number of tiles included for PGE33 is 289. The Period Specification Production Rule is required for PGE33 to generate the daily tile products.

The required inputs are MODAGAGG and MOD12Q1. MODAGAGG been generated only in day mode. Thus, the output product MOD15A1 is produced only in day mode. The MOD12Q1 input, which is the MODIS Level 3 quarterly Land Cover Type product at 1km resolution generated from PGE41, is also created only in day mode. For the first part of the mission, MOD12Q1 will not be available. The University of Maryland MODIS Group will generate a L3 quarterly land cover product in the same format as the MOD12Q1 to be used to provide the land cover information during the first part of the mission. The source of data for the land cover product will be other satellite data. The time range covered by the file will be three months prior to the start of the mission. This MOD12Q1 file will be stored as a static data file in the MOD15LUT. When the dynamic MOD12Q1 files are produced, the Advanced Temporal Production Rule will be used to set a delta time to acquire the proper MOD12Q1 granule.

PGE33 requires the Latitude/Longitude Tiling Production Rule. To execute PGE33, a Latitude/Longitude tile definition file must be associated with the PGE. For each individual execution, MODAPS will create a recipe instance with a particular Tile ID and pass the Tile ID back to the PGE. Since PGE33 now obtains the TileID the start date/time, and the end date/time from the input products, MODAPS does not need to set the TileID and data dates as dynamic runtime parameters.

Five tiling schemes were used to produce the input product of MODAGAGG. These five tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Surface Reflectance products. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. Since MODAPS combines the tile schemes into one file, only one profile of PGE33 is required.

The Production Rules for PGE32 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1),
- Advanced Temporal

Data Files

Static Input ESDT

MOD15LUT	MODIS/Terra LUTs for Production of MOD_PR15A1 products
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Dynamic Product Input ESDT

MODAGAGG	MODIS/Terra BRDF Preprocessing Database Daily L3 Global 1km ISIN Grid (R) 1
MOD12Q1	MODIS/Terra Land Cover Type 96-Day L3 Global 1km ISIN Grid (R) 1

Dynamic Product Output ESDT

MOD15A1	MODIS/Terra Leaf Area Index/FPAR Daily L4 Global 1km ISIN Grid (A_M) 1
MOD15A1C	MODIS/Terra Coarse Leaf Area Index/FPAR Daily L4 Global 5km ISIN Grid (I_M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Leaf Area Index/FPAR Daily L4 Global 1km ISIN Grid (File name contains MOD_SS.MOD15A1 to identify the particular subsetted product.) One file is produced per validation site. (I_M) 15

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I_M) 2
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Temporary Output Files

Temporary log file written by MOD_PR15A1, MOD15A1.log

Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS Value = {AM1M, PM1M}>
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Static Runtime Parameters for Operations

SizeMBECSDData Granule value	5.69449
ReprocessingPlanned value	no further update anticipated
ReprocessingActual value	processed once
ParameterName value	MOD15A1
ParameterName value for the coarse product	MOD15A1C
FPAR_PCF_NBAND	2
FPAR_PCF_NSAT	41
FPAR_PCF_VIEWPOLDIM	5
FPAR-PCF-VIEWAZIDIM	6
FPAR_PCF_SUNPOLDIM	4
FPAR_PCF_EPS00	1.00
FPAR_PCF_EPS01	1.00
FPAR_PCF_EPSSAT	0.10
FPAR_PCF_ENGDATA	0
FPAR_PCF_MBR	0
FPAR_PCF_THRESHOLD	0.50
FPAR_PCF_METHOD	2
FPAR_PCF_BROWSE	5,5HDFEOS
FPAR_PCF_LANDCOV_FLD	1
mod_prss_infile_luns	215030
mod_prss-outfile_luns	215031
PGE33 Version	<Version of PGE33 that appears in the clList delivered with the code>

4.34. Level 4 8-Day Leaf Area Index/FPAR (PGE34)

PGE34 performs the L4 8-Day Leaf Area Index (LAI) /FPAR processing at MODAPS.

Purpose

PGE34 produces L4 8-day LAI/FPAR product (MOD15A2), the corresponding coarse resolution product (MOD15A2C), the Land QA product (MODLM_QA), and the subsetted MOD15A2 product (MOD_SS).

Structure

PGE34 consists of the L4 daily LAI/FPAR process (MOD_PR15A2) and the Land QA process (MOD_PRLQA). PGE34 also runs the Land shared MOD_PR.SS.pl script to produce the subsetted products.

MODAPS V1 Production

PGE34 runs in MODAPS V1 Loader MDL10, which is executed every 8 days upon the availability of all required input daily Land products covering the 8-day processing period. MODAPS runs PGE34 for each of the Land tiles configured in the Data Processing System after MOD15A1 daily products are produced. Products archived at MODAPS are the 8-Day MOD15A2 tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD15A2 to the PDR Server for archive and distribution at the EDC DAAC.

MODAPS V2 Production

PGE34 runs in MODAPS V2, Recipe AM1M_L10 which is executed every 8 days upon the availability of all required input daily Land products covering the 8-day processing period. MODAPS runs PGE34 for each of the Land tiles configured in the Data Processing System after MOD15A1 daily products are produced. Products archived at MODAPS are the 8-Day MOD15A2 tiled granules. MODAPS Interim products are MOD15A2C, MOD_SS and MODLM_QA. MODAPS exports MOD15A2 to the PDR Server for archive and distribution at the EDC DAAC.

Production Rules

PGE34 runs after eight days of L4 daily LAI/FPAR (PGE33) outputs are completed. The operational scenario is nominally 338 activations every eight days, representing the processing of one land tile per PGE execution. However, due to disk space allocations for priority product, the actual number of tiles included for PGE34 may be less than 338. The Period Start of 8 Days Production Rule is required for PGE34 to generate the 8-day

tiled products. PGE34 will require a “Smart” Start of Year Production Rule at the end of each year.

The required input is MOD15A1 which has been generated only in day mode. Thus, the output product MOD15A2 and coarse resolution product MOD15A2C are produced only in day mode.

PGE34 requires the Latitude/Longitude Tiling Production Rule. To execute PGE34, a Latitude/Longitude tile definition file must be associated with the PGE. For each individual execution, MODAPS will create a recipe instance with a particular Tile ID and pass the Tile ID back to the PGE. Since PGE34 now obtains the TileID, the start date/time, and the end date/time from the input products, MODAPS does not need to set the TileID and data dates as dynamic runtime parameters.

Five tiling schemes were used to produce the input product of MOD15A1. These five tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Surface Reflectance products. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. Since MODAPS combines the tile schemes into one file, only one profile of PGE34 is required.

The Production Rules for PGE34 are:

- •Period Start of 8 Days
- •“Smart” Start of Year
- •Latitude/Longitude Tiling
- •Runtime Parameters
- •Minimum Number of Granules (defaulted to 1)

Data Files

Dynamic Product Input ESDT

MOD15A1	MODIS/Terra Leaf Area Index/FPAR Daily L4 Global 1 km ISIN Grid (R) 2
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Dynamic Product Output ESDT

MOD15A2	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 1 km ISIN Grid (A_M) (A_D) 1
MOD15A2C	MODIS/Terra Coarse Leaf Area Index/FPAR 8-Day L4 Global 5km ISIN Grid (I_M) 1

MOD_SS MODIS/Terra Land Subsetting QA Files; Leaf Area Index/FPAR 8-Day L4 Global 1 km ISIN Grid (Filename contains MOD_SS.MOD15A2 to identify the particular subsetting products. One file is produced per validation site) (I_M) 15

Quality Control or Diagnostic Output ESDT

MODLE_QM MODIS/Terra Land Quality Assurance (I_M) 1

Dynanmic Runtime Parameters for Operations

SatelliteInstrument <Spacecraft platform for MODIS Instrument supplied by MODAPS Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

SizeMBECSDData Granule value	15.5
ReprocessingPlanned value	no further update anticipated
ReprocessingActual value	processed once
ParameterName value	MODPR15A2
PGEVersion value	2
FPAR_PCF_NBAND	2
FPAR_PCF_NSAT	41
FPAR_PCF_VIEWPOLDIM	5
FPAR_PCF_VIEWAZIDM	6
FPAR_PCF_SUNPOLDIM	4
FPAR_PCF_EPS00	0.20
FPAR_PCF_EPS01	0.20
FPAR_PCF_EPSSAT	0.10
FPAR_PCF_W0	0.10
FPAR_PCF_FDIR	1.0
FPAR_PCF_Threshold	0.50
FPAR_PCF_Method	2
FPAR_PCF_OPS	0
FPAR_PCF_PATHS	none
LCMP_PCF_ENGDATA	0
LCMP_PCF_MBR	0
LCMP_PCF_BROWSE	0
mod_press_infile_luns	215230
mod_prss_outfile_luns	215232
PGE34 Version	<Version of PGE34 that appears in the ciList delivered with the code>

4.35. Level 3 16-Day Vegetation Indices 1km (PGE35)

PGE35 performs the L3 16-day (1 km) Vegetation Indices processing at MODAPS.

Purpose

PGE35 produces the 16-day gridded Vegetation Indices product (MOD13A2) the corresponding 5km coarse resolution product (MOD13A2C), the Land QA product (MODLM_QA), and the subsetted MOD13A2 product (MOD_SS).

Structure

PGE35 consists of the 16-day gridded Vegetation Indices (1 km) process (MOD_PR13A2) and the Land QA process (MOD_PRLQA). PGE 35 also runs the Land shared MOD_PRSS.pl script to produce the subsetted products.

MODAPS V1 Production

PGE35 runs in MODAPS V1 Loader MDL12, which is executed every 16 days upon the availability of all required input L2G and daily Land products covering the 16-day processing period. MODAPS runs PGE 35 for each of the Land tiles configured in the Data Processing System after all 16 days of the MODAGAGG daily products are completed. Products archived at MODAPS are the 16 Day MOD13A2 tiled granules. MODAPS Interim products are MOD13A2C, MOD_SS, and MODLM_QA. MODAPS exports MOD13A2 to the PDR Server for archive and distribution at the EDC DAAC.

MODAPS V2 Production

PGE35 runs in MODAPS V2 Recipe AM1M_L12, which is executed every 16 days upon the availability of all required input L2G and daily Land products covering the 16-day processing period. MODAPS runs PGE 35 for each of the Land tiles configured in the Data Processing System after all 16 days of the MODAGAGG daily products are completed. Products archived at MODAPS are the 16 Day MOD13A2 tiled granules. MODAPS Interim products are MOD13A2C, MOD_SS, and MODLM_QA. MODAPS exports MOD13A2 to the PDR Server for archive and distribution at the EDC DAAC.

Production Rules

PGE35 runs after 16 days of the L3 Aggregation (PGE22) outputs have been produced. The operational scenario is nominally 338 activations per 16 days, representing the processing of one Land gridded tile per PGE run. However, due to disk space allocations for priority product data products, the actual number of tiles included for PGE35 may be less than 338. The Period Start of 16 days Production Rule is specified

for PGE35. PGE35 will require a “Smart” Start of Year Production Rule at the end of each year.

PGE35 requires the Latitude/Longitude Tiling Production Rule. To execute PGE35, a Latitude/Longitude tile definition file must be associated with the PGE. For each individual execution, MODAPS will create a recipe instance with a particular Tile ID and pass the Tile ID back to the PGE. Since PGE35 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Five tiling schemes were used to produce the input product MODAGAGG. These five tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Surface Reflectance products. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. A maximum of 16 daily granules of MODAGAGG are staged for each tile run, but the PGE maybe run with the minimum specified. Since MODAPS combines the tile schemes into one file, only one profile of PGE35 is required.

The required input product is MODAGAGG. MODAGAGG has been generated only in day mode. Thus, the output MOD13A2 product is produced only in day mode.

The Production Rules for PGE35 are:

- Period Start of 16 Days,
- “Smart” Start of Year,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files

MODAGAGG	MODIS/Terra BRDF Preprocessing Database Daily L3 Global 1km ISIN Grid (R) 1
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Dynamic Product Output ESDT

MOD13A2	MODIS/Terra Vegetation Indices 16-Day L3 Global 1km ISIN Grid (A _M) (A _D) 1
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MOD13A2C	MODIS/Terra Coarse Vegetation Indices coarse Product 16-Day L3 Global 5 km ISIN Grid (I _M) 1
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MOD_SS	MODIS/Terra Land Subsetting QA Files: Vegetation Indices 16-Day L3 Global 1km ISIN Grid (Filename
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contains MOD_SS.MOD13A2 to identify the particular subbetted products. One file is produced per validation site). (I_M) 15

Quality Control or Diagnostic Output ESDT

MODLE_QA MODIS/Terra Land Quality Assurance (I_M) 2

Dynamic Runtime Parameters for Operations

start date time	<Start time for data observations>
end date time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL metadata field	processed once
REPROCESSINGPLANNED metadata field	further update is anticipated
Product version number	<ESDT Collection VersionID for products of this PGE version, e.g., 3>
BRDFFalg;1=Perform BRDF,0 = Disable BRDF	1
CVMVCFalg;1=Perform CVMVC, 0 = Disable CVMVC	1
BRDF Data base file name	None
MinBRDFNumberofobservations	5
MinBRDFNDVI	-0.3
ExtraMaxBRDFNDVI	0.05
MinCVMVCNumberOfObservations	2
MinCVMVCNVI	-0.3
ExtraMaxCVMVCNDVI	0.05
mod_prss_infile_luns	213101
mod_prss_outfile_luns	213111
PGE35 Version	<Version of PGE25 that appears in the ciList delivered with the code>

4.36. Level 4 Daily Net Photosynthesis (PGE36)

PGE36 performs the daily L4 Net Photosynthesis (PSN) processing at MODAPS.

Purpose

PGE36 produces L4 daily Net Photosynthesis product (MOD17A1), and Net Photosynthesis Respiration Database product (MOD17APS) and the Land QA product (MODLM_QA).

Structure

PGE36 consists of the L4 PSN daily process (MOD_PR17A1) and the Land QA process (MOD_PRLQA), and a first-in-year initialization (MOD_PR17A0).

Although the two executables, MOD_PR17A0 and MOD_PR17A1, are discussed as separate executables, they are the same software controlled by a runtime parameter. The runtime parameter tells the executable to behave either as MOD_PR17A0, or as MOD_PR17A1. When PSN_PCF_BOUNDARY = 0, the executable behaves as MOD_PR17A0. When PSN_PCF_BOUNDARY =1 the executable behaves as MOD_PR17A1.

MODAPS V1 Production

PGE36 is run in MODAPS V1 Loader MDL5, which is executed everyday upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE36 once every year using the parameter switch to execute MOD_PR17A0, the initialization process, to produce initialized files of daily PSN (MOD17A1) and the process state database (MOD17APS) for each of the Land tiles configured in the Data Processing System. MODAPS then runs PGE36 using the parameter switch to execute MOD_PR17A1 to update the daily information for each tile after the MOD15A2 product is made in the Loader by PGE34. Products archived at MODAPS are the updated daily PSN (MOD17A1) and updated process state database (MOD17APS.) MODAPS Interim products are granules of MODLM_QA. MODAPS does not export any product from PGE36 to the PDR Server for archive at one of the DAACs.

MODAPS V2 Production

PGE36 is run in MODAPS V2, Recipe AM1M_L16a which is executed everyday upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE36 once every year using the parameter switch to execute MOD_PR17A0, the initialization process, to produce initialized files of daily PSN (MOD17A1) and the

process state database (MOD17APS) for each of the Land tiles configured in the Data Processing System. MODAPS then runs PGE36 using the parameter switch to execute MOD_PR17A1 to update the daily information for each tile after the MOD15A2 product is made in the Loader by PGE34. Products archived at MODAPS are the updated daily PSN (MOD17A1) and updated process state database (MOD17APS.) MODAPS Interim products are granules of MODLM_QA. MODAPS does not export any product from PGE36 to the PDR Server for archive at one of the DAACs.

Production Rules

Before MOD_PR17A1 can be run on a daily basis, an initialization step is required. This initialization is performed once every year before any daily products are produced for that year. MOD_PR17A0 performs the initialization. It produces a single MOD17APS (an HDF file) and 325 zeroed-out MOD17A1 Land tiles. To achieve this, MOD_PR17A0 is executed 325 times, once for each tile. During the first execution (no matter what the tile), runtime parameter PSN_PCF_BOUNDARY = 0 which causes MOD17APS to be created. During all subsequent executions, PSN_PCF_BOUNDARY = 1, which causes MOD17APS not to be overwritten.

Following the initialization step, PGE36 runs every day. It uses the most recent eight-day MOD15A2 and thus it runs typically eight days behind PGE33. The operational scenario is nominally 325 activations per day, representing the processing of one land tile per PGE execution. However, due to disk space allocation for priority products, the actual number of tiles included for PGE36 may be less than 325. The Period Specification Production Rule is required for PGE36 to generate the daily tile products. The required input product is the 8-day LAI/FPAR (MOD15A2), which has been generated only in day mode. Thus, the output PSN (MOD17A1) product is produced only in day mode. Other required inputs are the previous update MOD17A1 file, the previous MOD12Q1, and DFLAXMNT, which will be replaced for the consistent year reprocessing by DLLAXMNT when it becomes available.

PGE36 requires the Latitude/Longitude Tiling Production Rule. To execute PGE36, a Latitude/Longitude tile definition file must be associated with the PGE. For each individual execution, MODAPS will create a recipe instance with a particular Tile ID and pass the Tile ID back to the PGE. Since PGE36 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Five tiling schemes were used to produce the input product MOD15A2. These five tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Surface

Reflectance products. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. Since MODAPS combines the tile schemes into one file, PGE36 does not require multiple profiles for groups of files.

The production rules for the series of daily (PGE36), 8-day (PGE37), and yearly (PGE38) MODIS Land Level 4 PSN and NPP PGEs extend beyond the capabilities provided by the ECS PDPS. In addition to the ECS Production Rules, MODAPS provides a file update capability and some customized scheduling interfaces among PGEs which run on daily, periodic N-day cycles, and yearly cycles. PGEs 36 to 38 require the update capability and some customized scheduling interfaces. The source code for all three PGEs is the same, but the PCF contains a dynamic runtime parameter, PSN_PCF_BOUNDARY, that is set to different values for the three PGEs. The sections below contain the value of the PSN_PCF_BOUNDARY parameter for the two cases of PGE36 and a description of what happens when PGE36 is executed. The cases for PGE37 and PGE38 are discussed in their respective sections.

PSN_PCF_BOUNDARY = 0

- PGE36 is executed to start an annual period. On January 1 of a given processing year, MOD_PR17A1 writes a fresh (zero-filled) instance of the daily interim, PSN files, MOD17A1, for each of the Land tiles to be processed. In accord with other Land PGEs, PGE36 is executed once for each Land tile. The MOD17A1 files must be staged for update of its daily intermediate grid fields for the entire modeling year. The internal SDS matrices are dimensioned by 368 (365 days in the current year + 3 days in next year) to cover the last 8-day cycle which is extended to the next year. As a special case, PGE36 is executed with this parameter value of 0 for the very first day that MODIS data are processed during the mission to initialize the MOD17A1 interim files.

PSN_PCF_BOUNDARY = 1

- PGE36 is executed every day starting with January 2 of each year, once for each of the Land tiles. To complete the last 8-day cycle of the year, PGE36 is executed for three extra days into the next year for a regular year and two extra days into the next year for a leap year. PGE36 processes days 1 to 8 in an 8-day cycle (2 to 8 in the first cycle of the year). The order for the 8 days does not matter. Each subsequent day, the grid fields in the interim files of MOD17A1 are updated for each tile at the proper day position in the file.

PGE36 uses a daily intermediate file (MOD17APS) that contains a processing state table that allows the PGE to independently track exactly which year-day/tile combinations have been successfully processed. This processing table is a 2D Boolean array of NCSA type uint8 SDS named PGE36_PROC_STATE.V21. This 2D array is stored in an HDF file, and is used by all instances of PGE36, PGE37, and PGE38. This table can be read in case the MOD17A1 files become corrupt during their year of use as update files and the files have to be retrieved from a backup tape.

The Production Rules for PGE36 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files

Static Input ESDT

MOD17LUT	MODIS ancillary input look up tables (MOD17_ANC_R14.hdf) for production of MOD_PR17 products.
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Dynamic Ancillary Product Input ESDT

DFLAXMNT	DAO DAS special subset daily global climatology file (required for MOD_PR17A1, but not used by MOD_PR17A0; will be replaced by DAS Late Look product for the Consistent Year Reprocessing). (R) 1
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DLLAXMNT	DAO DAS Late Look Special Subset daily global climatology file (required for MOD_PR17A1, but not used by MOD_PR17A0; replaces DAS First Look product for the Consistent Year Reprocessing). (R) 1
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Dynamic Product Input ESDT

MOD15A2	MODIS/Terra Leaf Area Index/ FPAR 8-Day L4 Global 1km ISIN Grid (R) 1
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MOD12Q1	MODIS/Terra Land Cover Type 96-Day L3 Global
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	1km ISIN Grid (R) 1
MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km ISIN Grid (File is updated daily for an entire year.) (R) 1

Dynamic Product Output ESDT

MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km ISIN Grid (File is updated daily for an entire year.) (A _M) 1
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Dynamic Intermediate ESDT

MOD17APS	MODIS/Terra Net Photosynthesis/Respiration Database Daily L4 Global 1km ISIN Grid (A _M) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 2
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Dynamic Runtime Parameters for Operations

PS_PCF_BOUNDARY	0 for running the first-in year MOD_PR17A0 session, 1 for running the daily MOD_PR17A1 session.
DATADAY	<Day of Data Observations>
SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

PSN_PCF_MBR	0
PSN_PCF_BROWSE	0
PSN_PCF_ENG	1
PSN_PCF_LANDCOV_FLD	0 (use of the IGBP land cover definition)
SizeMBECSDDataGranule value	5.69449
ReprocessingPlanned value	no further update anticipated
ReprocessingActual value	processed once
PGE36 Version	<Version of PGE36 that appears in the ciList delivered with the code>
ParameterName value	MOD17A1

4.37. Level 4 8-Day Net Photosynthesis (PGE37)

PGE37 performs the L4 Net Photosynthesis (PSN) 8-day processing at MODAPS.

Purpose

PGE37 produces the L4 PSN 8-day product (MOD17A2), the corresponding coarse resolution product (MODA2C), and the Land QA product (MODLM_QA).

Structure

PGE37 consists of the PSN 8-day process (MOD_PR17A2) and the Land QA process (MOD_PRLQA).

MODAPS VI Production

PGE37 runs in MODAPS VI Loader MDL10 which is executed every 8 days upon the availability of all required input daily Land products (covering the 8-day processing period). MODAPS runs PGE37 for each of the Land tiles configured in the Data Processing System after MOD15A2 8-day products are produced by the Loader. Products archived at MODAPS are the 8-day MOD17A2 tiled granules and the coarse resolution 8-Day MOD17A2C tiled granules. MODAPS Interim products are granules of MODLM_QA. MODAPS exports MOD17A2 to the PDR Server for archive and distribution at the EDC DAAC.

MODAPS V2 Production

PGE37 runs in MODAPS V2 Recipe AM1M_L16b which is executed every 8 days upon the availability of all required input daily Land products (covering the 8-day processing period). MODAPS runs PGE37 for each of the Land tiles configured in the Data Processing System after MOD15A2 8-day products are produced by the Loader. Products archived at MODAPS are the 8-day MOD17A2 tiled granules and the coarse resolution 8-Day MOD17A2C tiled granules. MODAPS Interim products are granules of MODLM_QA. MODAPS exports MOD17A2 to the PDR Server for archive and distribution at the EDC DAAC.

Production Rules

PGE37 runs after eight days of MOD17A1 L4 daily PSN (PGE36) outputs are completed. The operational scenario is nominally 326 activations every 8 days, representing the processing of one Land tile per PGE execution. Due to restrictions of percent of data products to be produced, the actual number of tiles included for PGE37 may be less than 326. The Period Start of 8 Days Production Rule is required for

PGE37 to generate the 8-day tiled products. PGE37 will require a “Smart” Start of Year Production Rule at the end of each year. The primary required input product is MOD17A1 which has been generated only in day mode. It is updated by PGE37. Thus, the output MOD17A2 product is produced only in day mode. MOD15A2 and MOD12Q1 are also required inputs. Until the MOD12Q1 96-day product is being generated by MODAPS, a static file with data from another satellite and produced by UMD in the same format as MOD12Q1 will be staged for PGE37.

PGE37 requires the Latitude/Longitude Tiling Production Rule. To execute PGE37, a Latitude/Longitude tile definition file must be associated with the PGE. Since PGE37 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Five tiling schemes were used to produce the input product MOD17A1. These five tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Surface Reflectance products. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. Since MODAPS combines the tile schemes into one file, only one profile of PGE37 is required.

PGE37, the second in the series of PSN and NPP PGEs, is the composite period which occurs every 8 days. It requires the update capability and the periodic scheduling interfaces provided by MODAPS. There is only one case for PGE37 with the value of the PSN_PCF_BOUNDARY set to 2. A description of what happens when PGE37 is executed is listed below.

PSN_PCF_BOUNDARY = 2

- PGE37 is executed when the 8-day composite boundary is triggered. On the eighth day of each cycle, MOD_PR17A2 produces the 8-day PSN (MOD17A2) product file for each Land tile. PGE37 will only be run after all available 8 days of MOD17A1 are done. PGE37 also resets the two state fields in MOD17A1 for the next 8-day processing period. The last 8-day cycle includes three extra days of the next year for a regular year and two extra days of the next year for a leap year.

The Production Rules for PGE37 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files**Static Input ESDT**

MOD17LUT	MODIS/Terra ancillary input look-up tables (MOD17 Ancillary Input Tables) for production of MOD17* products
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Dynamic Product Input ESDT

MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km ISIN Grid (R) 1
MOD15A2	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 1km ISIN Grid (R) 1
MOD12Q1	MODIS/Terra Land Cover Type 96-Day L3 Global 1km ISIN Grid (Static file in same format is used until MOD12Q1 production is being performed) (R) 1

Dynamic Product Output ESDT

MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km ISIN Grid (updated by PGE37) (A _M) 1
MOD17A2	MODIS/Terra Net Photosynthesis 8-Day L4 Global 1km ISIN Grid (A _M) (A _D) 1
MOD17A2C	MODIS/Terra Coarse Net Photosynthesis 8-Day L4 Global 5km ISIN Grid (A _M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 2
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Dynamic Runtime Parameter for Operations

PSN_PCF_BOUNDARY	2 for running the 8-Day MOD_PR17A session
DATADAY	<Day of Data Observations>
SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS value = {AM1M, PM1M}>

Static Runtime Parameter for Operations

SizeMEBECSDDataGranule value	5.69449
ReprocessingPlanned value	no further update anticipated
ReprocessingActual value	processed once
ParameterName value	MOD17A2
ParameterName value for the coarse product	MOD17A2C
PSN_PCF_MBR	0
PSN_PCF_BROWSE	5,5,HDFEOS
PSN_PCF_ENG	1
PSN_PCF_LANDCOV_FLD	0
PGE37 Version	<Version of PGE37 that appears in the ciList delivered with the code>

4.38. Level 4 Yearly Net Primary Production (PGE38)

PGE38 performs the yearly L4 Net Primary Production (NPP) processing at MODAPS.

Purpose

PGE38 produces L4 NPP yearly product (MOD17A3), the corresponding coarse resolution product (MOD17A3C), and the Land QA product (MODLM_QA).

Structure

PGE38 consists of the L4 NPP yearly process (MOD_PR17A3) and the Land QA process (MOD_PRLQA).

MODAPS VI Production

PGE38 runs in MODAPS VI Loader MDL16 that is executed once a year when all daily runs of PGE36 have completed for the year. MODAPS runs PGE38 for each of the Land tiles configured in the Data Processing System. Products archived at MODAPS are the yearly MOD17A3 tiled granules and the coarse resolution MOD17A3C tiled granules. MODAPS Interim products are granules of MODLM_QA. MODAPS exports MOD17A3 to the PDR Server for archive and distribution at the EDC DAAC.

MODAPS V2 Production

PGE38 runs in MODAPS V2 Recipe AM1M_L16c that is executed once a year when all daily runs of PGE36 have completed for the year. MODAPS runs PGE38 for each of the Land tiles configured in the Data Processing System. Products archived at MODAPS are the yearly MOD17A3 tiled granules and the coarse resolution MOD17A3C tiled granules. MODAPS Interim products are granules of MODLM_QA. MODAPS exports MOD17A3 to the PDR Server for archive and distribution at the EDC DAAC.

Production Rules

PGE38 runs after one year of L4 8-day PSN (PGE37) outputs are completed. The operational scenario is nominally 325 activations per year, representing the processing of one Land tile per PGE execution. Due to restrictions of percent of data products to be produced, the actual number of tiles included for PGE38 may be less than 325. The Period Specification Production Rule and "Smart" Start of Year are required for PGE38 to generate the yearly tiled products. The primary required input product is MOD17A1 which has been generated only in day mode. Thus, the output MOD17A3 and MOD17A3C products are produced only in day mode. The most current LAI/FPAR

(MOD15A2) and the 96-day Land Cover Type, (MOD12Q1), and are also required inputs. However, until MOD12Q1 is actually produced on a 96-day period, a static file with the same format provided by UMD is used for input.

PGE38 requires the Latitude/Longitude Tiling Production Rule. To execute PGE38, a Latitude/Longitude tile definition file must be associated with the PGE. Since PGE38 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Five tiling schemes were used to produce the input product MOD17A1. These five tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Surface Reflectance products. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. Since MODAPS combines the tile schemes into one file, only one profile of PGE38 is required.

PGE38, the third in the series of PSN and NPP PGEs, also requires the update capability and the periodic scheduling interface provided by MODAPS. There is only one case for PGE38 with the value of the PSN_PCF_BOUNDARY set to 3. A description of what happens when PGE38 is executed are described below.

PSA_PCF_BOUNDARY = 3

- PGE38 is executed when all of the daily, intermediate grid fields for the entire modeling year have been filled in the MOD17A1 interim update files. PGE38 outputs the annual NPP product, MOD17A3, for each Land tile. The annual product includes three extra days of the next year for a regular year and two extra days of the next year for a leap year.

The Production Rules for PGE38 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Advanced Temporal,
- “Smart” Start of Year,
- Minimum Number of Granules (defaulted to 1).
-
-
-
-

Data Files

Static Input ESDT

MOD17LUT	MODIS/Terra for ancillary input look-up tables (MOD17_ANC_RI4.hdf) for Production of MOD_17* products
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Dynamic Product Input ESDT

MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km ISIN Grid (R) 1
MOD15A2	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 1km ISIN Grid (R) 1
MOD12Q1	MODIS/Terra Land Cover Type 96-Day L3 Global 1km ISIN Grid (R) 1

Dynamic Product Output ESDT

MOD17A3	MODIS/Terra Net Primary Production Yearly L4 Global 1km ISIN Grid (A_M) (A_D) 1
MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km ISIN Grid (updated by PGE38) (A_M) 1
MOD17A3C	MODIS/Terra Coarse Net Primary Production Yearly L4 Global 5km ISIN Grid (A_M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I_M) 2
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Dynamic Runtime Parameters for Operations

PSN_PCF_Boundary	3 for running the yearly MOD_PR17A3 session
DATADAY	<Day of Data Observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>.

Static Runtime Parameters For Operations

SlizeMBECSDDataGranule value	5.69449
ReprocessingPlanned value	no further update anticipated
ReporcessingActual value	processed once
ParameterName value	MOD17A3
ParameterName value for the coarse product	MOD17A3C

PSN_PCF_BOUNDARY	3
PSN_PCF_MBR	0
PSN_PCF_BROWSE	5,5,HDFEOS
PSN_PCF_ENG	1
PSN_PCF_LANDCOV_FLD	0
PGE38 Version	<Version of PGE38 that appears in the ciList delivered with the code>

4.39. Level 4 8-Day Net Photosynthesis CMG (PGE39)

PGE39 performs the L4 8-Day CMG Net Photosynthesis (PSN) processing at MODAPS.

Purpose

PGE39 produces the 8-Day CMG PSN product (MOD17C2) and the Land QA product (MODLM_QA).

Structure

PGE39 consists of the L4 CMG PSN 8-Day process (MOD_PR17C2) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE39.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE39.

Production Rules

PGE39 runs after the 8-day tiles of L4 PSN (PGE37) output have been produced in the processing period. The operational scenario is nominally one activation for each tile every 8 days. The Period Start of 8 Days Production Rule is required for PGE39. PGE39 will require a “Smart” Start of Year Production Rule at the end of each year.

The required input to PGE39 is the current 8-day PSN tiled composites (MOD17A2). The gridded MOD17C2 product is generated from all of the available 8-day tiles of MOD17A2. A Minimum Number of Granules, representing the number of 8-day tiles, is specified for MOD17A2 and a time-out is associated for running PGE39 if the minimum requirements are met.

The Production Rules for PGE39 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD17A2	MODIS/Terra Net Photosynthesis 8-Day L4 Global 1km ISIN Grid (R) *
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Dynamic Product Output ESDT

MOD17C2	MODIS/Terra Net Photosynthesis 8-Day L4 Global
	56km CMG (A_M) (A_D) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I_M) 1
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- MODIS Science team has not yet delivered PGE 39; the minimum number of files required for production is unavailable.

4.40. Level 3 32-Day Land Cover (PGE40)

PGE40 performs the L3 32-day Land Cover processing at MODAPS.

Purpose

PGE40 produces the L3 32-day Land Cover Database product (MOD12M), the corresponding subsetting product (MOD_SS), and the Land QA product (MODLM_QA).

Structure

PGE40 consists of the L3 32-day gridded Land Cover Database process (MOD_PR12M) and the Land QA process (MOD_PRLQA). PGE40 also runs the Land shared MOD_PRSS.pl script to produce the subsetted products.

MODAPS V1 Production

PGE40 runs in MODAPS V1 Loader MDL14, which is executed every 32 days upon the availability of the daily land aggregation products and several 8-day and 16-day land products for the 32-day period. MODAPS runs PGE40 for each of the Land tiles configured in the Data Processing System. Products archived at MODAPS are the 32-day MOD12M Land Cover Database tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS does not export any products from PGE40 to the PDR Server for archive at one of the DAACs.

MODAPS V2 Production

PGE40 runs in MODAPS V2 Recipe AM1M_L14, which is executed every 32 days upon the availability of the daily land aggregation products and several 8-day and 16-day land products for the 32-day period. MODAPS runs PGE40 for each of the Land tiles configured in the Data Processing System. Products archived at MODAPS are the 32-day MOD12M Land Cover Database tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS does not export any products from PGE40 to the PDR Server for archive at one of the DAACs.

Production Rules

PGE40 runs after 32 days of the L3 16-day 1 km gridded Vegetation Indices product (MOD13A2 from PGE35), the L3 16-day BRDF/Albedo product (MOD43B1 from PGE23), the L3 16-day Nadir BRDF-Adjusted Reflectance product (MOD43B4 from PGE23), L3 Land Surface Temperature product (MOD11A2 from PGE31), and L3 BRDF Texture Database product (MODAGTEX from PGE22) are generated. At least one MOD43B4 granule is required for the processing of each tile of the output MOD12M. The MOD11A2, MOD13A2, MOD43B1, and MODAGTEX granules are

optional. The quality of the PGE40 product of L3 monthly land cover is improved greatly if one month of the L3 BRDF Texture Database at 1km (MODAGTEX from PGE22) products and the L3 8-day gridded Land Surface Temperature/Emissivity at 1km (MOD11A2 from PGE31) products are also available.

The operational scenario is nominally 338 activations every 32 days, representing the processing of one land tile per PGE execution. Due to restrictions of percent of data products to be produced, the actual number of tiles included for PGE40 may be less than 338. The Period Start of 32 Days Production Rule is required for PGE40. PGE40 will require a "Smart" Start of Year Production Rule at the end of each year.

PGE40 requires the Latitude/Longitude Tiling Production Rule. To execute PGE40, a Latitude/Longitude tile definition file must be associated with the PGE. Since PGE40 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Five tiling schemes were used to produce all of the input products (MOD11A2, MOD13A2, MOD43B1, MOD43B4, MODAGTEX). These five tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Surface Reflectance products. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. Since MODAPS combines the tile schemes into one file, only one profile of PGE40 is required.

The input MOD11A2 is a tiled product generated with both day and night mode data. All of the other tiled input products are day only. PGE40 handles the mixed day and night mode tiles of MOD11A2 internally.

A runtime parameter is passed to PGE40 to indicate that the MOD12M product is to be subsetting and written to MOD_SS files. This runtime parameter contains the logical unit number for the product. A second runtime parameter contains the corresponding logical unit number for the output MOD_SS files. The version of number of PGE40 is also passed to the PGE as a runtime parameter.

The Production Rules for PGE40 are:

- Period Start of 32 Days,
- "Smart" Start of Year,
- Optional Inputs,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files

Dynamic Product Input ESDT

MOD11A2	MODIS/Terra Land Surface Temperature/ Emissivity 8-Day L3 Global 1km ISIN Grid (O) 0
MOD13A2	MODIS/Terra Vegetation Indices 16-Day L3 Global 1km ISIN Grid (O) 0
MOD43B1	MODIS/Terra BRDF/Albedo Model-1 16-Day L3 Global 1km ISIN Grid (O) 0
MOD43B4	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16- Day L3 Global 1km ISIN Grid (R) 1
MODAGTEX	MODIS/Terra BRDF Texture Database Daily L3 Global 1km ISIN Grid (O) 0

Dynamic Product Output ESDT

MOD12M	MODIS/ Terra Land Cover Database 32-Day L3 Global 1km ISIN Grid (A _M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Land Cover Database 32-Day L3 Global 1km ISIN Grid (Filename contains MOD_SS.MOD12M to identify the particular subsetting product. One file is produced per validation site. A maximum of 15 sites are allowed.) (I _M) 15

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}.>
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Static Runtime Parameters for Operations

PGE40 Version	<Version of PGE40 that appears in the ciList delivered with the code.>
mod_prss_infile_luns	212050
mod_prss_outfile_luns	212052

4.41. Level 3 32-Day Land Cover (PGE40)

PGE40 performs the L3 32-day Land Cover processing at MODAPS.

Purpose

PGE40 produces the L3 32-day Land Cover Database product (MOD12M), the corresponding subsetting product (MOD_SS), and the Land QA product (MODLM_QA).

Structure

PGE40 consists of the L3 32-day gridded Land Cover Database process (MOD_PR12M) and the Land QA process (MOD_PRLQA). PGE40 also runs the Land shared MOD_PRSS.pl script to produce the subsetted products.

MODAPS V1 Production

PGE40 runs in MODAPS V1 Loader MDL14, which is executed every 32 days upon the availability of the daily land aggregation products and several 8-day and 16-day land products for the 32-day period. MODAPS runs PGE40 for each of the Land tiles configured in the Data Processing System. Products archived at MODAPS are the 32-day MOD12M Land Cover Database tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS does not export any products from PGE40 to the PDR Server for archive at one of the DAACs.

MODAPS V2 Production

PGE40 runs in MODAPS V2 Recipe AM1M_L14, which is executed every 32 days upon the availability of the daily land aggregation products and several 8-day and 16-day land products for the 32-day period. MODAPS runs PGE40 for each of the Land tiles configured in the Data Processing System. Products archived at MODAPS are the 32-day MOD12M Land Cover Database tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS does not export any products from PGE40 to the PDR Server for archive at one of the DAACs.

Production Rules

PGE40 runs after 32 days of the L3 16-day 1 km gridded Vegetation Indices product (MOD13A2 from PGE35), the L3 16-day BRDF/Albedo product (MOD43B1 from PGE23), the L3 16-day Nadir BRDF-Adjusted Reflectance product (MOD43B4 from PGE23), L3 Land Surface Temperature product (MOD11A2 from PGE31), and L3 BRDF Texture Database product (MODAGTEX from PGE22) are generated. At least one MOD43B4 granule is required for the processing of each tile of the output

MOD12M. The MOD11A2, MOD13A2, MOD43B1, and MODAGTEX granules are optional. The quality of the PGE40 product of L3 monthly land cover is improved greatly if one month of the L3 BRDF Texture Database at 1km (MODAGTEX from PGE22) products and the L3 8-day gridded Land Surface Temperature/Emissivity at 1km (MOD11A2 from PGE31) products are also available.

The operational scenario is nominally 338 activations every 32 days, representing the processing of one land tile per PGE execution. Due to restrictions of percent of data products to be produced, the actual number of tiles included for PGE40 may be less than 338. The Period Start of 32 Days Production Rule is required for PGE40. PGE40 will require a "Smart" Start of Year Production Rule at the end of each year.

PGE40 requires the Latitude/Longitude Tiling Production Rule. To execute PGE40, a Latitude/Longitude tile definition file must be associated with the PGE. Since PGE40 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Five tiling schemes were used to produce all of the input products (MOD11A2, MOD13A2, MOD43B1, MOD43B4, MODAGTEX). These five tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Surface Reflectance products. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. Since MODAPS combines the tile schemes into one file, only one profile of PGE40 is required.

The input MOD11A2 is a tiled product generated with both day and night mode data. All of the other tiled input products are day only. PGE40 handles the mixed day and night mode tiles of MOD11A2 internally.

A runtime parameter is passed to PGE40 to indicate that the MOD12M product is to be subsetting and written to MOD_SS files. This runtime parameter contains the logical unit number for the product. A second runtime parameter contains the corresponding logical unit number for the output MOD_SS files. The version of number of PGE40 is also passed to the PGE as a runtime parameter.

The Production Rules for PGE40 are:

- Period Start of 32 Days,
- "Smart" Start of Year,
- Optional Inputs,
- Latitude/Longitude Tiling,
- Runtime Parameters,

- Minimum Number of Granules (defaulted to 1).

Data Files

Dynamic Product Input ESDT

MOD11A2	MODIS/Terra Land Surface Temperature/ Emissivity 8-Day L3 Global 1km ISIN Grid (O) 0
MOD13A2	MODIS/Terra Vegetation Indices 16-Day L3 Global 1km ISIN Grid (O) 0
MOD43B1	MODIS/Terra BRDF/Albedo Model-1 16-Day L3 Global 1km ISIN Grid (O) 0
MOD43B4	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16- Day L3 Global 1km ISIN Grid (R) 1
MODAGTEX	MODIS/Terra BRDF Texture Database Daily L3 Global 1km ISIN Grid (O) 0

Dynamic Product Output ESDT

MOD12M	MODIS/ Terra Land Cover Database 32-Day L3 Global 1km ISIN Grid (A _M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Land Cover Database 32-Day L3 Global 1km ISIN Grid (Filename contains MOD_SS.MOD12M to identify the particular subsetting product. One file is produced per validation site. A maximum of 15 sites are allowed.) (I _M) 15

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}.>
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Static Runtime Parameters for Operations

PGE40 Version	<Version of PGE40 that appears in the ciList delivered with the code.>
mod_prss_infile_luns	212050
mod_prss_outfile_luns	212052

4.42. Level 3 96-Day Land Cover Quarterly CMG (PGE42)

PGE42 performs the L3 96-Day CMG Land Cover processing at MODAPS.

Purpose

PGE42 produces the L3 96-day CMG Land Cover products (MOD12C1 and MOD12C2) and the Land QA product (MODLM_QA).

Structure

PGE42 consists of the L3 96-day CMG Land Cover process (MOD_PR12C) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE42.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE42.

Production Rules

PGE42 runs after the L3 96-day Land Cover (PGE41) products have been produced. The operations scenario is nominally one activation every 96 days. The Period Start of 96 Days Production Rule is required for PGE42. PGE42 will require a "Smart" Start of Year ProductionRule at the end of each year.

The required inputs are MOD12Q1 and MOD12Q2 (Future) which have been generated only in day mode. Thus, the output products MOD12C1 and MOD12C2 (Future) are produced only in day mode. The gridded MOD12C1 and MOD12C2 products are generated from all of the available 96-day tiles of Land Cover products. A minimum Number of Granules, representing the number of 96-day tiles, is specified for MOD12Q1 and MOD12Q2 and a time-out is associated for running PGE42 if the minimum requirements are met.

Data Files

Dynamic Product Input ESDT

MOD12Q1	MODIS/Terra Land Cover Type 96-Day L3 Global 1km ISIN Grid (R) *
MOD12Q2	MODIS/Terra Land Cover Change 96-Day L3 Global 1km ISIN Grid (Future Product) (R) *

Dynamic Product Output ESDT

MOD12C1	MODIS/Terra Land Cover Type 96-Day L3 Global 56km CMG (A _M) (A _D) 1
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MOD12C2	MODIS/Terra Land Cover Change 96-Day L3 Global 56km CMG (Future product) (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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*MODIS Science Team has not yet delivered PGE42; the minimum number of files required for production is unavailable.

4.43. Level 3 Daily Snow Cover (PGE43)

PGE43 performs the L3 daily Snow Cover processing at MODAPS.

Purpose

PGE43 produces the L3 gridded daily Snow Cover product (MOD10A1) and the corresponding subsetted product (MOD_SS). It also produces the Land QA product (MODLM_QA).

Structure

PGE43 consists of the L3 gridded daily Snow Cover process (MOD_PR10A1) and the Land QA process (MOD_PRLQA). PGE43 also runs the Land shared MOD_PRSS.pl script to produce the subsetted product.

MODAPS V1 Production

PGE43 runs in MODAPS V1 Loader MDL5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE43 for each of the Land tiles configured in its Data Processing System for Snow Cover products upon the availability of the L2G Snow Cover granules (MOD10L2G) from PGE 14 and L2G pointers (MODPTHKM) and geoangles (MODMGGAD) from PGE12. Products archived at MODAPS are the daily Snow Cover (MOD10A1) tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD10A1 to the PDR Server for archive and distribution at the NSIDC DAAC.

MODAPS V2 Production

PGE43 runs in MODAPS V2 Recipe AM1M_L5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE43 for each of the Land tiles configured in its Data Processing System for Snow Cover products upon the availability of the L2G Snow Cover granules (MOD10L2G) from PGE 14 and L2G pointers (MODPTHKM) and geoangles (MODMGGAD) from PGE12. Products archived at MODAPS are the daily Snow Cover (MOD10A1) tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD10A1 to the PDR Server for archive and distribution at the NSIDC DAAC.

Production Rules

PGE43 runs after a full day of L2G Snow Cover (PGE14) processing has completed and the MOD10L2G products have been generated. The operational scenario is nominally 338 activations per day, representing the processing of one Land tile per PGE

execution. Due to restrictions of percent of data products to be produced, the actual number of tiles included for PGE43 may be less than 338. The Period Specification of one day is required for PGE43.

PGE43 requires the Latitude/Longitude Tiling Production Rule. To execute PGE43, a Latitude/Longitude tile definition file must be associated with the PGE. Since PGE43 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Six tiling schemes were used to produce the input products of L2G Snow Cover (MOD10L2G). The tiling schemes are shown in Table 4-2. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. Since MODAPS combines the tile schemes into one file, only one profile of PGE43 is required.

The required input product is MOD10L2G, which has been generated only in day mode. Thus, the output product MOD10A1 is produced only in day mode.

The current plans include processing L3 daily snow cover between 30 to 90 degrees North for Northern Hemisphere for the entire year and additional data in other identified areas. The Tiling schemes under which the Snow Cover products are generated will accomplish the geographical selection.

MODAPS V2 passes a dynamic runtime parameter to PGE43 to indicate the spacecraft platform for the MODIS Instrument. The value is either "AM1M" or "PM1M".

A runtime parameter is passed to PGE43 to indicate that the MOD10A1 product is to be subsetted and written to MOD_SS files. This runtime parameter contains the logical unit number for the product. A second runtime parameter contains the corresponding logical unit numbers for the output MOD_SS files. The version number of PGE43 is also passed to the PGE as a runtime parameter.

The Production Rules for PGE43 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files

Dynamic Input ESDT

MOD10L2G	MODIS/Terra Snow Cover Daily L2G Global 500m ISIN Grid (R) 1
MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km ISIN Grid (R) 1
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m ISIN Grid (R) 1

Dynamic Product Output ESDT

MOD10A1	MODIS/Terra Snow Cover Daily L3 Global 500m ISIN Grid (A _M) (A _D) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Snow Cover Daily L3 Global 500m ISIN Grid (Filename contains MOD_SS.MOD10A1 to identify the particular subsetting product. One file is produced per validation site. A maximum of 15 sites is allowed,) (I _M) 15

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameter for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
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Static Runtime Parameters for Operations

mod_prss_infile_luns	210101
mod_prss_outfile_luns	210104
PGE44 Version	<Version of PGE44 that appears in ciList delivered with the code>

4.44. Level 3 Daily Sea Ice Extent (PGE44)

PGE44 performs the L3 daily Sea Ice Extent processing at MODAPS.

Purpose

PGE44 produces the L3 gridded daily Sea Ice Extent product (MOD29P1D and MOD29P1N for day and night mode, respectively) and the Land QA product (MODLM_QA).

Structure

PGE44 consists of the L3 gridded Daily Sea Ice Extent process (MOD_PR29A1) and the Land QA process (MOD_PRLQA). PGE44 also runs the Land shared MOD_PRSS.pl Script to produce the subsetted products.

MODAPS V1 Production

PGE44 runs in MODAPS V1 Loader MDL5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE44 for each of the Land tiles configured in its Data Processing System for Sea Ice Extent products upon the availability of L2G Sea Ice granules (MOD29PGD and MOD29PGN) in Day and Night mode from PGE15 and L2G pointers (MODPTPGD and MODPTPGN) and L2G geoangles (MODMGP GD and MODMGDGN) from PGE12. Products archived at MODAPS are the daily Sea Ice Extent (MOD29P1D and MOD29P1N) tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD29P1D and MOD29P1N to the PDR Server for archive and distribution at the NSIDC DAAC.

MODAPS V2 Production

PGE44 runs in MODAPS V2 Recipe AM1M_L5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE44 for each of the Land tiles configured in its Data Processing System for Sea Ice Extent products upon the availability of L2G Sea Ice granules (MOD29PGD and MOD29PGN) in Day and Night mode from PGE15 and L2G pointers (MODPTPGD and MODPTPGN) and L2G geoangles (MODMGP GD and MODMGDGN) from PGE12. Products archived at MODAPS are the daily Sea Ice Extent (MOD29P1D and MOD29P1N) tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD29P1D and MOD29P1N to the PDR Server for archive and distribution at the NSIDC DAAC.

Production Rules

PGE44 runs after a full day of L2G Sea Ice (PGE15) processing has completed and produced the MOD29PGD and MOD29PGN products. The operational scenario is nominally 130 activations per day for day mode data and 130 activations for night mode data, representing the processing of one sea-ice tile per PGE execution. Due to restrictions of percent of data products, the actual number of tiles included for PGE44 may be less than 130. The Period Specification of one day is required for PGE44.

PGE44 requires the Latitude/Longitude Tiling Production Rule. To execute PGE44, a Latitude/Longitude tile definition file must be associated with the PGE. The Sea Ice products are currently being generated in the polar projection EASE Grid. A separate tile scheme is configured in MODAPS for the EASE Grid tiles. The TileIDs are different for the EASE Grid than the ISIN Grid tiles used for other Land Products. PGE 44 has retained the capability of producing ISIN Grid products as it did in previous versions. The TileID in the input granule tells the PGE whether to generate polar EASE-Grid products or the ISIN Grid Products. Since PGE44 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a runtime parameter.

Two tiling schemes for day and night modes were used to produce the input products of MOD29PGD and MOD29PGN. The tiling schemes are shown in Table 4-2. Since there is a separation of day and night mode data and a switch for TILEMODE of day or night is passed to the PGE script, two profiles of PGE44 are required. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one.

The required input is MOD29PGD or MOD29PGN, which have been generated separately in day mode and night mode. Thus, the MOD29P1D and MOD29P1N output products are produced separately in day mode and night mode. MOD29P1D and MOD29P1N are to be produced for all of the tiles of data located in the area of 50 degrees latitude to 90 degrees latitude for both the Northern Hemisphere and Southern Hemisphere for every day of the year. The tiling schemes under which the Sea Ice products were generated will accomplish the geographical selection.

MODAPS V2 passes a dynamic runtime parameter to PGE44 to indicate the Spacecraft platform for the MODIS instrument. The value is either "AM1M" or "PM1M". MODAPS also passes the TILEMODE parameter to PGE44 to indicate whether "Day" or "Night" products are to be generated.

A runtime parameter is passed to PAGE44 to indicate that the MOD29PID and MOD29PIN products are to be subsetting and written to MOD_SS files. The runtime parameter contains the logical unit number for the product. A second runtime parameter contains the corresponding logical unit numbers for the output MOD_SS files. The version number of PGE44 is also passed to the PGE as a runtime parameter.

The Production Rules for PGE44 are:

- Period Specification,
- Metadata Based Query,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files

Dynamic Product Input ESDT

MOD29PGD	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Day (R) 1
MOD29PGN	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Night (R) 1
MODPTPGD	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Day (R) 1
MODPTPGN	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Night (R) 1
MODMGPGD	MODIS/Terra Geolocation Angles Daily L2G Global 1km EASE-Grid Day (R) 1
MODMGPGN	MODIS/Terra Geolocation Angles Daily L2G Global 1km EASE-Grid Night (R) 1

Dynamic Product Output ESDT

MOD29P1D	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Day (A_M) (A_D) 1
MOD29P1N	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Night (A_M) (A_D) 1

MOD_SS MODIS/Terra Land Subsetting QA Files: Sea Ice Extent Daily L3 Global 1km EASE-Grid Day (Filename contains MOD_SS.MOD29P1D to identify the particular subsetted product. One file is produced per validation site. A maximum of 15 sites is allowed.) (I_M) 15

MOD_SS MODIS/Terra Land Subsetting QA Files: Sea Ice Extent Daily L3 Global 1km EASE-Grid Night (Filename contains MOD_SS.MOD29P1N to identify the particular subsetted product. One file is produced per validation site. A maximum of 15 sites is allowed.) (I_M) 15

Quality Control or Diagnostic Output ESDT

MODLM_QA MODIS/Terra Land Quality Assurance (I_M) 1

Dynamic Runtime Parameter for Operations

TILEMODE <Switch to indicate whether Day or Night products are to be generated. Values = {Day, night}>

SatelliteInstrument <Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM-1, PM-1}>

Static Runtime Parameters for Operations

mod_prss_infile_luns	229301
mod_prss_outfile_luns	229303
PGE44 Version	<Version of PGE44 that appears in ciList delivered with the code.>

4.45. Level 3 8-Day Snow Cover (PGE45)

PGE 45 performs the L3 8-day Snow Cover processing at MODAPS.

Purpose

PGE45 produces the L3 8-day gridded Snow Cover product (MOD10A2) and the corresponding subsetted product (MOD_SS). It also produces the Land QA product (MODLM_QA).

Structure

PGE46 consists of the 8-day Snow Cover process (MOD_PR10A2) and the Land QA process (MOD_PRLQA). PGE 45 also runs the Land shared MOD_PRSS.pl script to produce the subsetted product.

MODAPS V1 Production

PGE 45 runs in MODAPSV1 Loader MDL10, which is executed every 8 days upon the availability of all required input daily Land products covering the 8-Day processing period. MODAPS runs PGE 45 for each of the Land tiles configured in the Data Processing System after the required daily snow products are generated. Products archived at MODAPS are the 8-Day Snow Cover product (MOD10A2) tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD10A2 to the PDR Server for archive and distribution at the NSIDC DAAC.

MODAPS V2 Production

PGE 45 runs in MODAPSV2 Recipe AM1M_L10, which is executed every 8 days upon the availability of all required input daily Land products covering the 8-Day processing period. MODAPS runs PGE 45 for each of the Land tiles configured in the Data Processing System after the required daily snow products are generated. Products archived at MODAPS are the 8-Day Snow Cover product (MOD10A2) tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD10A2 to the PDR Server for archive and distribution at the NSIDC DAAC.

Production Rules

PGE 45 runs after eight days of L3 daily Snow Cover (PGE43) processing has completed. The operational scenario is nominally 338 activations every 8 days, representing the processing of one land tile per PGE execution. Due to restrictions of percent of data products to be produced, the actual number of tiles included for PGE 45

may be less than 338. The Period Start of 8 Days Production Rule is required for PGE 45. PGE45 will require a "Smart" Start of Year Production Rule at the end of each year

PGE45 requires the Latitude/Longitude Tiling Production Rule. To execute PGE45, a Latitude/Longitude tile definition file must be associated with the PGE. Since PGE44 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Six tiling schemes were used to produce the input product of MOD10A1. These six tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Snow Cover product. All MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set to one as a default. Since MODAPS combines the tile schemes into one file, only one profile of PGE45 is required.

The required input is MOD10A1 which has been generated only in day mode. Thus, the output product MOD10A2 is produced only in day mode.

MODAPS V2 passes a dynamic runtime parameter to PGE45 to indicate the spacecraft platform for the MODIS Instrument. The value is either "AM1M" or "PM1M". In addition it passes the dynamic runtime parameters for the start date and time for data observations and end date and time for data observations.

A runtime parameter is passed to PGE45 to indicate that the MOD10A2 product is to be subsetting and written to MOD_SS files. The runtime parameter contains the logical unit number for the product. A second runtime parameter contains the corresponding logical unit numbers for the output MOD_SS files. The version number of PGE45 is also passed to the PGE as a runtime parameter.

The Production Rules for PGE45 are:

- Period Start of 8 Days,
- "Smart" Start of Year
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files

Dynamic Product Input ESDT

MOD10A1	MODIS/Terra Snow Cover Daily L3 Global 500m ISIN Grid
	(R) 2

Dynamic Product Output ESDT

MOD10A2	MODIS/Terra Snow Cover 8-Day L3 Global 500m ISIN Grid (A _M) ((A _D) 1
MOD_SS	MODIS/Terra Subsetting QA Files: Snow Cover 8-Day L3 Global 500m ISIN Grid (Filename contains MOD_SS.MOD10A2 to identify the particular subsetting product. One file is produced per validation site. A maximum of 15 sites is allowed.) (I _M) 15.

Quality control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameter for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
Start date time	<Start date and time for data observations>
End date time	<End date and time for data observations>

Static Runtime Parameter for Operations

mod_prss_infile_luns	210102
mod_prss_outfile_luns	210103
PGE44 Version	<Version of PGE44 that appears in ciList delivered with the code.>

4.46. Level 3 Daily Snow Cover CMG (PGE46)

PGE46 performs the daily CMG Snow Cover processing at MODAPS.

Purpose

PGE46 produces the L3 daily gridded CMG Snow Cover product (MOD10C1) and the Land QA product (MODLM_QA).

Structure

PGE46 consists of the daily CMG Snow Cover process (MOD_PR10C1) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

PGE46 runs in MODAPS V1 Loader MDL9, which is executed every day upon the availability of all required Land tiled granules covering the daily processing period and required for daily CMG products. MODAPS runs PGE46 for each of the Land tiles configured in the Data Processing System after the daily Snow Cover tiled granules are generated. Products archived at MODAPS are granules of the daily Snow Cover CMG product, MOD10C1. MODAPS Interim products are MODLM_QA files. MODAPS exports MOD10C1 to the PDR Server for archive and distribution at the NSIDC DAAC.

MODAPS V2 Production

PGE46 runs in MODAPS V2 Recipe AM1M_L9, which is executed every day upon the availability of all required Land tiled granules covering the daily processing period and required for daily CMG products. MODAPS runs PGE46 for each of the Land tiles configured in the Data Processing System after the daily Snow Cover tiled granules are generated. Products archived at MODAPS are granules of the daily Snow Cover CMG product, MOD10C1. MODAPS Interim products are MODLM_QA files. MODAPS exports MOD10C1 to the PDR Server for archive and distribution at the NSIDC DAAC.

Production Rules

PGE46 runs after one day of L3 Snow Cover (PGE43) processing has been produced. The operational scenario is nominally one activation every day. The Period Specification Production Rule is required for PGE46.

The required input is MOD10A1 which has been generated only in day mode. Thus, the output product MOD10C1 is produced only in day mode. The gridded MOD10C1 product is generated from all of the available daily tiles of L3 Snow Cover product. A

Minimum Number of Granules, representing the number of daily tiles, is specified for MOD10A1 and a time-out is associated for running PGE46 if the minimum requirements are met.

The Production Rules for PGE46 are:

- Period Specification,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD10LUT	MODIS/Terra Level 3 Snow Cover LUTS for production of MOD10 CMG products
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Dynamic Product Input ESDT

MOD10A1	MODIS/Terra Snow Cover Daily L3 Global 500m ISIN Grid (R) 1
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Dynamic Product Output ESDT

MOD10C1	MODIS/Terra Snow Cover Daily L3 Global 28km CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
start date time	<Start date and time for data observations>
end date time	<End date and time for data observations>

Static Runtime Parameters for Operations

PGE46 Version	<Version of PGE46 that appears in ciList delivered with the code>
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4.47. Level 3 8-Day Sea Ice Extent (PGE47)

PGE47 performs the L3 8-day Sea Ice Extent processing at MODAPS.

Purpose

PGE47 produces the L3 8-day gridded Sea Ice Extent products (MOD29P2D and MOD29P2N) and the Land QA product (MODLM_QA).

Structure

PGE47 consists of the L3 8-day Sea Ice Extent process (MOD_PR29A2) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE47.

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE47.

Production Rules

PGE47 runs after 8 days of L3 daily Sea Ice Extent (PGE44) has completed. The operational scenario is nominally 130 activations every 8 days, representing the processing of one land tile per PGE execution. Due to restrictions of percent of data products, the actual number of tiles included for PGE47 may be less than 338. The Period Start of 8 Days Production Rule is required for PGE47. PGE47 will require a “Smart” Start of Year Production Rule at the end of each year.

PGE47 requires the Latitude/Longitude Tiling Production Rule. To execute PGE47, a Latitude/Longitude tile definition file must be associated with the PGE. The Sea Ice products are currently being generated in the polar projection EASE-Grid. A separate tile scheme is configured in MODAPS for the EASE-Grid tiles. The TileIDs are different for the EASE-Grid from the ISIN Grid used for other Land products. PGE47 has retained the capability of producing ISIN Grid products as it did in previous versions. The TileID in the input granule tells PGE47 whether to generate polar EASE-Grid products or the ISIN Grid products. Since PGE47 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

Two tiling schemes were used to produce the input products of MOD29P1D and MOD29P1N. These two tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Sea Ice product. All MODIS PGEs requiring the

Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set as a default to one. Since there is a separation of day and night mode data, two profiles of PGE47 are required. A switch for TILEMODE of Day or Night is passed to the PGE script.

The required inputs are MOD29P1D and MOD29P1N which have been generated separately in day mode and night mode. Thus, the output products MOD29P2D and MOD29P2N are produced separately in day mode and night mode.

MODAPS V2 passes a dynamic runtime parameter to PGE47 to indicate the spacecraft platform for the MODIS Instrument. The value is either "AM1M" or "PM1M". MODAPS also passes the TILEMODE parameter to PGE47 to indicate whether "Day" or "Night" products are to be generated. The version number of PGE47 is also passed to the PGE as a runtime parameter.

The Production Rules for PGE47 are:

- Period Start of 8 Days,
- "Smart" Start of Year,
- Metadata Based Query,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files

Dynamic Product Input ESDT

MOD29P1D	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Day (R)*
MOD29P1N	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Night (R)*

Dynamic Product Output ESDT

MOD29P2D	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1km EASE-Grid Day (A _M) (A _D) 1
MOD29P2N	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1km EASE-Grid Night (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA MODIS/Terra Land Quality Assurance (I_M) 1

- *The MODIS Science Team has not yet delivered PGE47; the minimum number of
- files required is unavailable.

Dynamic Runtime Parameters **

TILEMODE <Switch to indicate whether Day or Night products are
to be generated. Values = {Day, night}>

SatelliteInstrument <Spacecraft platform for MODIS Instrument supplied
by MODAPS. Value = {AM1M, PM1M}>

Static Runtime Parameters **

PGE47 Version <Version of PGE47 that appears in
ciList delivered with the code>

- ** The MODIS Science Team has not yet delivered PGE47; the dynamic and static runtime parameters may not be complete.

4.48. Level 3 Daily Sea Ice Extent CMG (PGE48)

PGE48 performs the daily CMG Sea Ice Extent processing executed at MODAPS.

Purpose

PGE48 produces the L3 daily CMG gridded Sea Ice Extent product (MOD29C1D and MOD29C1N) and the Land QA product (MODLM_QA).

Structure

PGE48 consists of the daily CMG Sea Ice Extent process (MOD_PR29C1) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE48.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE48.

Production Rules

PGE48 runs after one day of L3 Sea Ice Extent daily (PGE44) output has been produced. The operational scenario is nominally one activation per day. The Period Specification Production Rule is required for PGE48.

The required inputs are MOD29P1D and MOD29P1N which have been generated separately in day mode and night mode. Thus, the output products MOD29C1D and MOD29C1N are produced separately in day mode and night mode.

Two profiles of PGE48 must be configured in MODAPS, one for day mode and one for night mode. The gridded MOD29C1D and MOD29C1N products are generated from all of the available daily tiles of L3 Sea Ice Extent product. A Minimum Number of Granules, representing the number of daily tiles, is specified for MOD29P1D and MOD29P1N and a time-out is associated for running PGE48 if the minimum requirements are met.

The Production Rules for PGE48 are:

- Period Specification,
- Metadata Based Query,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD29P1D	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Day (R) *
MOD29P1N	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Night (R) *

Dynamic Product Output ESDT

MOD29C1D	MODIS/Terra Sea Ice Extent Daily L3 Global 28km CMG Day (A_M) (A_D) 1
MOD29C1N	MODIS/Terra Sea Ice Extent Daily L3 Global 28km CMG Night (A_M) (A_D) 1

*MODIS Science Team has not yet delivered PGE48; the minimum number of files required for production is unavailable.

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I_M) 1
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Dynamic Runtime Parameters for Operations**

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
start date time	<Start date and time for date observation>
end date time	<End date and time for data observations>

Static Runtime Parameter for Operations**

PGE48 Version	<Version of PGE48 that appears in ciList delivered with the code>
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**MODIS Science Team has not yet delivered PGE48; dynamic and static runtime parameters may not be complete.

4.49. Level 3 8-Day Oceans Interim (PGE49)

PGE49 performs the L3 Oceans Interim 8-Day processing at MODAPS.

Purpose

PGE49 produces L3 Oceans Interim 8-Day products. The two types of products are 36 day time 8-Day composites of Ocean Color and both daytime and nighttime 8-Day composites of Sea Surface Temperature (SST) for two parameters.

Structure

PGE49 consists of the Ocean Time Binning process (MOD_PRmtbin).

MODAPS V1 Production

PGE49 is run in MODAPS V1 Loader MDO3, which is executed every 8-days upon the availability of the Oceans Interim daily MODOCA_{nn} (where nn = parameters 1...36) and MOD28A_{mm} (where mm = parameters D1, D2, N1, N2) granules covering the processing period. Products archived at MODAPS are the Oceans Interim 8-Day MODOCE_{nn} (where nn = parameters 1...36), and MOD28E_{mm} (where mm = parameters D1, D2, N1, N2). There are no exported products to the GSFC DAAC from PGE49. All of the products are MODAPS Interim products.

MODAPS V2 Production

PGE49 is run in MODAPS V2 Recipe AM1M_O3a, which is executed every 8-days upon the availability of the Oceans Interim daily MODOCA_{nn} (where nn = parameters 1...36) and MOD28A_{mm} (where mm = parameters D1, D2, N1, N2) granules covering the processing period. Products archived at MODAPS are the Oceans Interim 8-Day MODOCE_{nn} (where nn = parameters 1...36), and MOD28E_{mm} (where mm = parameters D1, D2, N1, N2). There are no exported products to the GSFC DAAC from PGE49. All of the products are MODAPS Interim products.

Production Rules

PGE49 runs after eight days of L3 Oceans Interim daily (PGE20) processing has been completed. The operational scenario is nominally 40 activations every eight days, representing the processing of one of 36 Ocean Color Parameters or one of two Ocean SST parameters in either the day or night mode per PGE execution. The Period Start of 8 Days Production Rule is required for PGE49. PGE49 will require a "Smart" Start of Year Production Rule at the end of each year. The Oceans PGEs also require a

specification to override the default of including the few days of the next year in the product made during the last period of the year.

One of the Ocean Color or SST parameter products (MODOCA_{nn} , MOD28A_{mm}) is required for each PGE execution. Thus, PGE49 must be run 40 times every 8-days. PGE49 requires the Specification of the Data Days to be included, using the special Data Day implementation of the Runtime Parameter Production Rule. For this Production Rule, MODAPS stages the eight input data days for the parameter being processed and passes the start dataday and end dataday to the PGE as Runtime Parameters. A Minimum Number of Granules for the daily required input Oceans product is specified and a time-out is associated for running PGE49 if the minimum requirements are met.

The Production Rules for PGE49 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Data Day
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MODOCTB	MODIS/Terra Ocean Time Binner Parameters
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Dynamic Product Input ESDT

One of the following for each PGE profile activation:

MODOCA_{nn}	MODIS/Terra Ocean Color Time-Binned Interim Params 1-36 Daily L3 Global 4km ISEAG (where nn = parameters 1-36) (R) 1*
MOD28A_{mm}	MODIS/Terra Sea Surface Temperature Time-Binned Interim Params 1-4 Daily L3 Global 4km ISEAG (where mm = parameters D1, D2, N1, N2) (R) 1*

Dynamic Product Output ESDT

One of the following for each PGE profile activation:

MODOCE _{nn}	MODIS/Terra Ocean Color Interim Composite Params 1-36 8-Day L3 Global 4km ISEAG (where nn = parameters 1-36) (A _M) 1*
MOD28E _{mm}	MODIS/Terra Sea Surface Temperature Interim Composite Params 1-4 8-Day L3 Global 4km ISEAG (where mm = parameters D1, D2, N1,N2) (A _M) 1*

*Per parameter

Dynamic Runtime Parameters for Operations

start dataday	<Start Day for Data Observations (yyyyddd)>
end dataday	<End Day for Data Observations (yyyyddd)>
band to map	<Parameter name>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	0
time flag	W
output quality	M
gsfc quality	1
longitude, origin	0.0
latitude, origin	0.0
projection rotation	0.0
longitude, center	0.0
latitude, center	0.0
output image width in degree	0.0
output image height in degrees	180.0
equa	0
name	<Parameter name>
units	<Parameter units>
slope	1.0
intcp	0.0
scale	0
bias	0
which quality field	D
profile	27
PGE Version	<Version of PGE49 that appears in the ciList delivered with the code>

4.50. Level 3 24-Day Oceans Reference (PGE50)

PGE50 performs the L3 Ocean 24-Day (3-Week) Reference processing at MODAPS.

Purpose

PGE50 produces the L3 Ocean 24-Day Reference products (one per PGE execution): Ocean Color MODOCR_{nn} (where nn = 1...36), and Sea Surface Temperature (SST) MOD28R_{mm} (where mm = D1, D2, N1, N2). It also produces temporary files: MODOCF_{nn} (where nn = 1...36) and MOD28F_{mm} (where mm = D1, D2, N1, N2).

Structure

PGE 50 consists of the L3 Ocean 24-Day running (3-Week) Reference processes (MOD_PRmtbin and MOD_PRmfill). Figure 4-8 shows the structure of PGE50.

MODAPS V1 Production

PGE50 is run in MODAPS V1 Loader MDO3, which is executed every 8 days upon completion of the three consecutive Oceans Interim 8-Day MODOCE_{nn} (where nn = parameters 1...36) and MOD28E_{mm} (where mm = parameters D1, D2, N1, N2) granules covering the processing period. Products archived at MODAPS are the 24-Day Reference products, MODOCR_{nn} (where nn = parameters 1...36) and MOD28R_{mm} (where mm = parameters D1, D2, N1, N2). The middle week (8-day) of the 24-Day Reference file matches the 8-day processing period for the next MODAPS Loader execution. This middle week reference file is always produced 8 days behind the current Oceans Interim 8-day product from MDO3. There are currently no exported products from PGE50. All of the above products are MODAPS Interim products. However, in the future the MODOCR_{nn} and MOD28R_{mm} may be archived at the GSFC DAAC. PGE50 also produces temporary files of MODOCF_{nn} and MOD28F_{mm}, which are deleted at the completion of the PGE run.

MODAPS V2 Production

PGE50 is run in MODAPS V2 Recipe AM1M_O3b, which is executed every 8 days upon completion of the three consecutive Oceans Interim 8-Day MODOCE_{nn} (where nn = parameters 1...36) and MOD28E_{mm} (where mm = parameters D1, D2, N1, N2) granules covering the processing period. Products archived at MODAPS are the 24-Day Reference products, MODOCR_{nn} (where nn = parameters 1...36) and MOD28R_{mm} (where mm = parameters D1, D2, N1, N2). The middle week (8-day) of the 24-Day

Reference file matches the 8-day processing period for the next MODAPS Loader execution. This middle week reference file is always produced 8 days behind the current Oceans Interim 8-day product from MDO3. There are currently no exported products from PGE50. All of the above products are MODAPS Interim products. However, in the future the MODOCR_{nn} and MOD28R_{mm} may be archived at the GSFC DAAC. PGE50 also produces temporary files of MODOCF_{nn} and MOD28F_{mm} , which are deleted at the completion of the PGE run.

Production Rules

PGE50 runs after three sequential L3 Oceans Interim 8-day (PGE49) output products are completed. The middle 8-day week of the sequence is the processing period. The operational scenario is nominally 40 activations every 8 days, representing the processing of one of 36 Ocean Color Parameters or one of two Ocean SST parameters in either the day or night mode per PGE execution. The Period Start of 8 Days Production Rule is required for PGE50 to generate the L3 Oceans 24-day Reference products. PGE50 will require a "Smart" Start of Year Production Rule at the end of each year. The Oceans PGEs also require specification of an override for the default of including the few days of the next year in the product made during the last period of the year.

The L3 24-day composites of Ocean Color and SST are archived for use in subsequent Ocean processing. The corresponding temporary products are deleted after the PGE run. One of the Ocean Color or SST parameter products (MODOCE_{nn} or MOD28E_{mm}), is required for each PGE execution.

The Advanced Temporal Production Rule is used to specify a negative delta time from the start of the processing period to acquire the previous 8-day L3 Oceans weekly granule. This Production Rule is also used to specify a positive delta time from the end of the processing to acquire the 8-day (weekly) L3 Oceans granule following the processing period. The algorithms for setting the delta times in the start and end of the data processing period for these ancillary data sets are described in Section 5.8, Advanced Temporal Production Rule.

PGE50 requires the Specification of the Data Days to be included, using the special Data Day implementation of the Runtime Parameter Production Rule. For this Production Rule, MODAPS stages the 8-day composites for the parameter being processed and passes the start dataday and end dataday to the PGE as Runtime Parameters. A Minimum Number of Granules, representing the number of input 8-day

L3 Oceans weekly granules, is specified for the 24-day product and a time-out is associated for running PGE50 if the minimum requirements are met.

The Production Rules for PGE50 are:

Period Start of 8 Days,
 “Smart” Start of Year,
 Data Day,
 Runtime Parameters,
 Advanced Temporal,
 Minimum Number of Granules.

Data Files

Static Input ESDT

MODOCMSK	MODIS/Terra Oceans Processing Land and Shallow Water Masks
MODOCTB	MODIS/Terra Ocean Time Binner Parameters

Dynamic Product Input ESDT

One of the following for each PGE profile activation:

MODOCE _{nn}	MODIS/Terra Ocean Color Interim Composite Params 1-36 8-Day L3 Global 4km ISEAG (where nn = parameters 1-36) (R) 3
MOD28E _{mm}	MODIS/Terra Sea Surface Temperature Interim Composite Params 1-4 8-Day L3 Global 4km ISEAG (where mm = parameters D1, D2, N1, N2) (R) 3

Dynamic Product Output ESDT

One of the following for each PGE profile activation:

MODOCR _{nn}	MODIS/Terra Ocean Color Interim Composite Params 1-36 24-Day L3 Global 4km ISEAG (where nn = Parameters 1-36) (A _M) 1
MOD28R _{mm}	MODIS/Terra Sea Surface Temperature Interim Composite Params 1-4 24-Day L3 Global 4km ISEAG (where mm = parameters D1, D2, N1, N2) (A _M) 1

Temporary Output Files

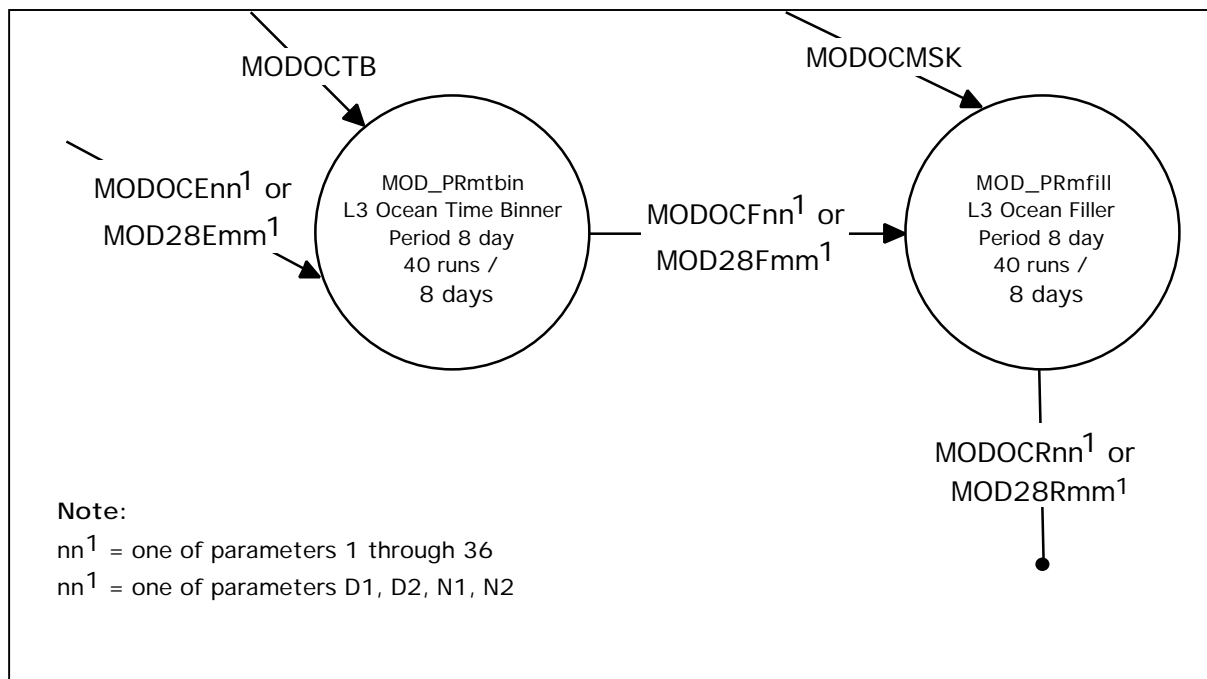
MODOCF _{nn}	MODIS/Terra Ocean Color Temporary Composite Params 1-36 24-Day L3 Global 4km ISEAG (where nn = parameters 1-36) (T _M) 1
MOD28F _{mm}	MODIS/Terra Sea Surface Temperature Temporary Composite Params 1-4 24-Day L3 Global 4km ISEAG (where mm = parameters D1, D2, N1,N2) (T _M) 1

Dynamic Runtime Parameter for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
end dataday	<End Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
Param Name	<Name of parameter to process>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	0
boxsiz	7
wq	B
iter	100
qual	A
time flag	R
PGE Version	<Version of PGE50 that appears in the ciList delivered with the code>

**Figure 4-8 PGE50 Structure**

4.51. Level 4 8-Day and Running Yearly Oceans Productivity Indices (PGE51)

PGE51 is the L4 Ocean 8-Day (Weekly) and Running Yearly Productivity Indices PGE processing at MODAPS.

Purpose

PGE51 produces the L4 8-day (weekly) and running annual Ocean Productivity Indices products (MOD27W and MOD27Y) and corresponding L4 8-day (weekly) (MOAPWA, MOAPWB, MOAPW1) maps and L4 yearly (MOAPYA, MOAPYB, MOAPY1) maps.

Structure

PGE51 consists of the L3 ocean 8-day (weekly) Productivity Indices and yearly Productivity Indices processes (MOD_PR27W and MOD_PR27Y). Figure 4-9 shows the structure of PGE51.

MODAPS V1 Production

PGE51 is run in MODAPS V1 Loader MDO5, which is executed every 8 days upon the availability of MODOCW₂₃, MODOCW₂₇, and MOD28W_{D1} granules covering the processing period. Optional inputs to the 8-day processing are 1 to 8 daily files of DFLAXENG and 1 to 8 daily files of FNMOC_ML within the processing period. DFLAXENG will be replaced by DLLAXMNT in the near future. Products archived at MODAPS for the 8-day period are granules of MOD27W, MOAPWA, MOAPWB, and MOAPW1. The MOAPWA, MOAPWB, and MOAPW1 map products consist of 8 parameter files each. MODAPS exports the MOD27W, MOAPWA, MOAPWB, and MOAPW1 to the PDR Server for archive and distribution at the GSFC DAAC. PGE51 is also run once a year using all MOD27W 8-day granules available for the processing year. Products archived at MODAPS for the yearly period are granules of MOD27Y, MOAPYA, MOAPYB, and MOAPY1. The MOAPYA, MOAPYB, and MOAPY1 map products consist of 10 parameter files each. MODAPS exports the MOD27Y, MOAPYA, MOAPYB and MOAPY1 to the PDR Server for archive and distribution at the GSFC DAAC.

MODAPS V2 Production

PGE51 is run in MODAPS V2 Recipe AM1M_O5, which is executed every 8 days upon the availability of MODOCW₂₃, MODOCW₂₇, and MOD28W_{D1} granules covering the

processing period. Optional inputs to the 8-day processing are 1 to 8 daily files of DFLAXENG and 1 to 8 daily files of FNMOC_ML within the processing period. DFLAXENG will be replaced by DLLAXMNT in the near future. Products archived at MODAPS for the 8-day period are granules of MOD27W, MOAPWA, MOAPWB, and MOAPW1. The MOAPWA, MOAPWB, and MOAPW1 map products consist of 8 parameter files each. MODAPS exports the MOD27W, MOAPWA, MOAPWB, and MOAPW1 to the PDR Server for archive and distribution at the GSFC DAAC. PGE51 is also run once a week using all MOD27W 8-day granules available for the processing year. Products archived at MODAPS for the yearly period are granules of MOD27Y, MOAPYA, MOAPYB, and MOAPY1. The MOAPYA, MOAPYB, and MOAPY1 map products consist of 10 parameter files each. MODAPS exports the MOD27Y, MOAPYA, MOAPYB and MOAPY1 to the PDR Server for archive and distribution at the GSFC DAAC.

Production Rules

PGE51 runs after the ocean color and SST 8-day files are produced by L3 Ocean Weekly (8-Day))(PGE54). PGE51 is activated once every 8 days to produce the weekly and running yearly products. MODOCW₂₇, MODOCW₂₃ and MOD28W_{D1} are required inputs. There are two optional ancillary input data sets: FNMOC_ML with eight daily files and DFLAXENG with eight daily files for each of the eight days of the processing period. In the future DFLAXENG will be replaced by DLLAXMNT, having the same number of files. The algorithms for setting the delta time in the start and end of the data processing period for these ancillary data sets are described in Section 5.8, Advanced Temporal Production Rule. A Minimum Number of Granules is to be set for each ancillary data type. If the ancillary data are not available, PGE runs without them and uses the climatological files in MOD27LUT. For the MOD_PR27W process, the start and end data days for the processing period need to be specified using the Ocean Data Day Production Rule which is a special implementation of the Runtime Parameter Production Rule. For this Production Rule, MODAPS stages all of the input granules within the start and end data days of the processing period and passes the "start dataday" and "end dataday" to the PGE as Runtime Parameters. The eight data day period contained in the input 8-day composites of ocean color and SST must match the eight data day period of the output product (MOD27W). The Period Start of 8 Days Production Rule is required for PGE51.

The inputs for MOD_PR27Y are one year of MOD27W including the current 8-day period. Thus, the Advanced Temporal Production Rule is required. A negative delta

time of one year is set for the start time of the processing period. The algorithms for setting the delta times in the start and end of the data processing period for these ancillary data sets are described in Section 5.8, Advanced Temporal Production Rule. The output MOD27Y is a running yearly product of Ocean Productivity Indices. If the processing week spans the year productivity, a "Smart" Start of Year Production Rule is required. The weekly products input to PGE51 use the "Smart" Start of Year Production Rule. Even during the early part of a new year PGE51 still requires 45 previous week files as input to the running year process. The Oceans PGEs also require as specification for MODAPS to use only data for the current year in the yearly composite.

The Production Rules for PGE51 are:

Period Start of 8 Days

"Smart" Start of Year

Optional Inputs

Data Day

Runtime Parameters

Minimum Number of Granules

Advanced Temporal

Data Files

Static Input ESDT

MOD27LUT	MODIS/Terra LUTs for Production of MOD27W, MOD27Y, and L4 Maps
----------	--

Dynamic Product Input ESDT

MODOCW ₂₃	MODIS/Terra Ocean Color QC'd Composite Params 1-36 8-Day L3 Global 4km ISEAG (Parameter 23 for MODAPS) (R) 1
MODOCW ₂₇	MODIS/Terra Ocean Color QC'd Composite Params 1-36 8-Day L3 Global 4km ISEAG (Parameter 27 for MODAPS) (R) 1
MOD28WD ₁	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 8-Day L3 Global 4km ISEAG (Parameter D1 for MODAPS) (R) 1
MOD27W	MODIS/Terra Ocean Weekly Productivity Indices 8-Day L4 Global 4km ISEAG (For yearly run, one year

of previous files) For weekly runs: (O) 0, For
yearly run: (R) 46

Dynamic Ancillary Product Input ESDT

DLLAXMNT	DAO DAS Late Look special subset daily global climatology file (Minimum number of files is 0, maximum number of files is 8) (O) 0
FNMOCLML	1 Degree FNMOCL Ocean Mixed-Layer Model Output; 2-D Gridded (L3) Ocean Surface Mixed Layer Depth; packed 8X into Daily file; GRIB format (Minimum number of files is 0, Maximum number of files is 8). (O) 0

Dynamic Product Output ESDT

MOD27W	MODIS/Terra Ocean Weekly Productivity Indices 8-Day L4 Global 4km ISEAG (A _M) (A _D) 1
MOD27Y	MODIS/Terra Ocean Annual Productivity Indices Yearly L4 Global 4km ISEAG (A _M) (A _D) 1
MOAPWA _{xx}	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 4km CylEqDis (where xx = Parameters M1, M2, ME, MD, N1, N2, F1, F2 for MODAPS) (A _M) (A _D) 1
MOAPWB _{xx}	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 36km CylEqDis (where xx = Parameters M1, M2, ME, MD, N1, N2, F1, F2 for MODAPS) (A _M) (A _D) 1
MOAPW1 _{xx}	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 1Deg CylEqDis (where xx = Parameters M1, M2, ME, MD, N1, N2, F1, F2 for MODAPS) (A _M) (A _D) 1
MOAPYA _{yy}	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 4km CylEqDis (where yy

	= Parameters M1, M2, S1, S2, W1, W2, N1, N2, F1, F2 for MODAPS) (A _M) (A _D) 1
MOAPYB _{yy}	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 36km CylEqDis (where yy = Parameters M1, M2, S1, S2, W1, W2, N1, N2, F1, F2 for MODAPS) (A _M) (A _D) 1
MOAPY1 _{yy}	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 1Deg CylEqDis (where yy = Parameters M1, M2, S1, S2, W1, W2, N1, N2, F1, F2 for MODAPS) (A _M) (A _D) 1

Dynamic Runtime Parameter for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
end dataday	<End Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

Static Runtime Parameter for Operations

PGEVersion	<Version of PGE51 that appears in the ciList delivered with the code>
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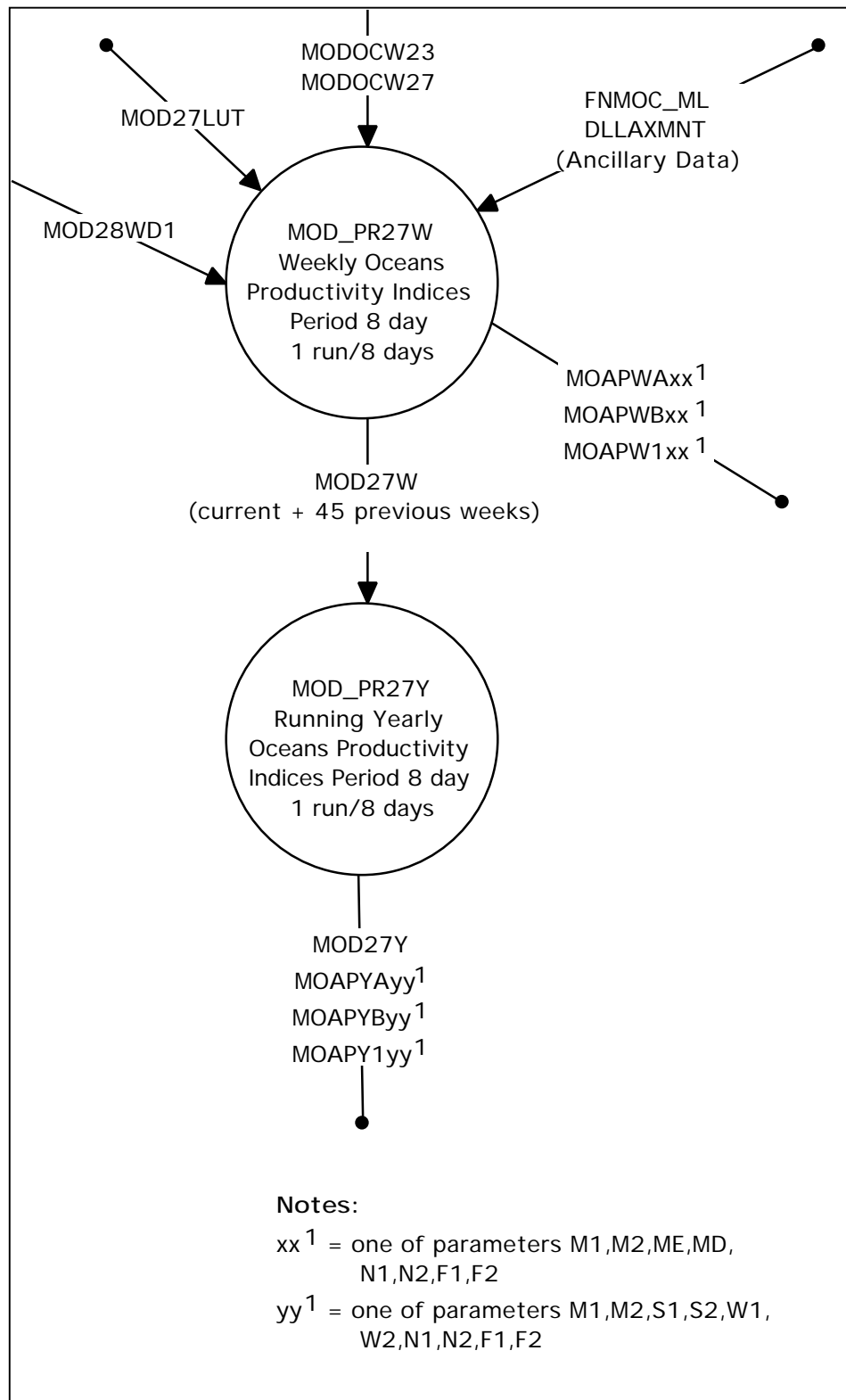


Figure 4-9 PGE51 Structure

4.52. Level 4 8-Day Oceans Chlorophyll Running Year Average and Annual Empirical Productivity (PGE52)

PGE52 performs the Ocean 8-day L3 Chlorophyll Running Year Average and L4 Annual Empirical Productivity processing.

Purpose

PGE52 produces the L3 Oceans interim 8-day Chlorophyll Running Year Average product (MODOCY27) and the L4 Annual Empirical Productivity (high variance) product (MOD27HV).

Structure

PGE52 consists of the MODIS Oceans time binning process for L4 Oceans Chlorophyll Running Year Average (MOD_PRmtbin) and MOD27HV Annual Empirical Productivity process (MOD_PR27HV). Figure 4-10 shows the structure of PGE52.

MODAPS V1 Production*

The MODIS Science Team has not yet delivered PGE52; production descriptions are based upon other similar Ocean PGEs.

PGE52 is run in MODAPS V1 Loader MDO5, which is executed every 8 days upon completion of the L3 Ocean Color Weekly (8-Day) MODOCW granules covering the processing period. Products archived at MODAPS are the MODOCY27 and MOD27HV binned products and the MOSPYA, MOSPYB, and MOSPY1 maps. MODAPS temporary products are the MODOCF27 intermediate storage files. MODAPS exports MODOCY27, MOD27HV, MOSPYA, MOSPYB, and MOSPY1 to the PDR Server for archive and distribution at the GSFC DAAC.

MODAPS V2 Production*

The MODIS Science Team has not yet delivered PGE52; production descriptions are based upon other similar Ocean PGEs.

PGE52 is run in MODAPS V2 Recipe AM1M_O6, which is executed every 8 days upon completion of the L3 Ocean Color Weekly (8-Day) MODOCW granules covering the processing period. Products archived at MODAPS are the MODOCY27 and MOD27HV binned products and the MOSPYA, MOSPYB, and MOSPY1 maps. MODAPS temporary products are the MODOCF27 intermediate storage files. MODAPS exports

MODOCY27, MOD27HV, MOSPYA, MOSPYB, and MOSPY1 to the PDR Server for archive and distribution at the GSFC DAAC.

Production Rules

PGE52 runs after all of the corresponding L3 Ocean 8-Day Chlorophyll MODOCW₂₇ (PGE54) outputs are completed. The operational scenario is nominally one activation every 8 days, representing the processing of one L3 Ocean Color 8-Day Running Year Product of Parameter 27 (MODOCY27) per PGE execution. The Period Start of 8 Days Production Rule is required for PGE52 to generate the 8-day MODOCY27 and MOD27HV products.

The required input is the current MODOCW₂₇ plus 45 input files of MODOCW₂₇ from the previous year. The running yearly process for MOD27HV takes the MODOCY27 as input. The Data Days covered in the input and output weekly products need to be specified using the Data Day Production Rule which is a special implementation of the Runtime Parameter Production Rule. For this Production Rule, MODAPS passes the start dataday and end dataday to the PGE as Runtime Parameters. PGE52 will require a “Smart” Start of Year Production Rule at the end of each year. The Oceans PGEs also require a specification to override the default of including the few days of the next year in the product made during the last period of the year.

The Production Rules for PGE52 are:

Period Start of 8 Days,
 “Smart” Start of Year,
 Data Day,
 Runtime Parameters.

Data Files

Static Input ESDT

MODOCTB

MODIS/Terra Ocean Time Binner Parameters

Dynamic Product Input ESDT

MODOCW₂₇

MODIS/Terra Ocean Color QC'd Composite Params
 1-36 8-Day L3 Global 4km ISEAG (Parameter 27 for
 MODAPS) (R) 46 (current + 45 previous week)

Dynamic Product Output ESDT

MODOCY27	MODIS/Terra Ocean Chlorophyll Running Year Average 8-Day L3 Global 4km ISEAG (A _M) (A _D) 1
MOD27HV	MODIS/Terra Ocean Annual Empirical Productivity 8- Day L4 Global 4km ISEAG (A _M) (A _D) 1
MOSPYA _{xx}	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 4km CylEqDis (where xx = parameters MP, MN, MX, MC, SC, WC, NC, FC for MODAPS) (A _M) (A _D) 1
MOSPYB _{xx}	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 36km CylEqDis (where xx = parameters MP, MN, MX, MC, SC, WC, NC, FC for MODAPS) (A _M) (A _D) 1
MOSPY1 _{xx}	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 1deg CylEqDis (where xx = parameters MP, MN, MX, MC, SC, WC NC, FC for MODAPS) (A _M) (A _D) 1

Temporary Output File

MODOCF27	MODIS/Terra Ocean Color Temporary Composite Params 1-36 8-Day L3 Global 4km ISEAG (Used for temporary storage of binned product) (I _M) 3
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Dynamic Runtime Parameter for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
end dataday	<End Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

Static Runtime Parameter for Operations

SMFLOG_SCREEN Switch value	0
time flag	Y
output quality	A
gsfc quality	1
PGEVersion	<Version of PGE52 that appears in the ciList delivered with the code>

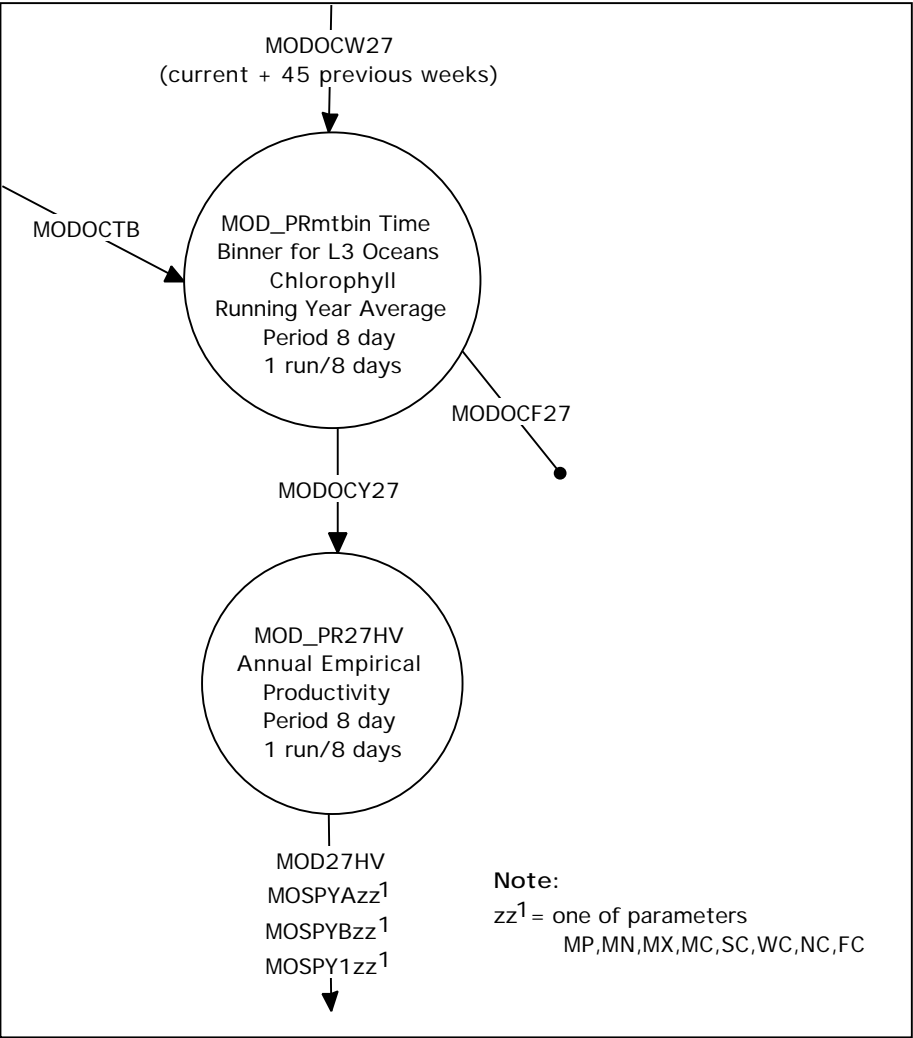


Figure 4-10 PGE52 Structure

4.53. Level 3 Daily Oceans (PGE53)

PGE53 performs the quality controlled L3 Daily Oceans processing at MODAPS.

Purpose

PGE53 produces the quality controlled L3 Daily Ocean Color MODOC_{nn} (where nn = parameters 1-36), L3 Daily Oceans Sea Surface Temperature (SST) MOD28D_{mm} (where mm = parameters D1, D2, N1, N2), and L3 daily maps of these products.

Structure

PGE53 consists of the Ocean Daily Declouding process (MOD_PR_{mcloud}) and the L4 mapping processes (MOD_PR_{mspc} and MOD_PR_{mmap}). Figure 4-11 shows the structure of PGE53.

MODAPS V1 Production

PGE53 is run in MODAPS V1 Loader MDO4, which is executed every eight days upon the completion of eight days of Ocean Color Time-Binned Interim Daily MODOCA_{nn} (where nn = parameters 1...36) and Sea Surface Temperature Time-Binned Interim Daily MOD28A_{mm} (where mm = parameters D1, D2, N1, N2) granules covering the processing period and the corresponding 24-day (3-week) Oceans reference files of MODOCR_{nn} and MOD28R_{mm} with the center week matching the eight day processing period. Products from PGE53 archived at MODAPS are the Oceans Daily MODOC_{nn} (where nn = parameters 1...36) and MOD28D_{mm} (where mm = parameters D1, D2, N1, N2) and the corresponding Daily Ocean Maps $M\{04,36,1D\}\{M,S,N,Q,F,1,2,3\}D_{##}$ (where $##$ = parameters 1...36 for Ocean Color products and D1, D2, N1, N2 for SST products). MODAPS exports MODOC_{nn} , MOD28D_{mm} and $M\{04,36,1D\}\{M,S,N,Q,F,1,2,3\}D_{##}$ to the PDR Server for archive and distribution at the GSFC DAAC.

MODAPS V2 Production

PGE53 is run in MODAPS V2 Recipe AM1M_O4a, which is executed every eight days upon the completion of eight days of Ocean Color Time-Binned Interim Daily MODOCA_{nn} (where nn = parameters 1...36) and Sea Surface Temperature Time-Binned Interim Daily MOD28A_{mm} (where mm = parameters D1, D2, N1, N2) granules covering the processing period and the corresponding 24-day (3-week) Oceans

reference files of MODOCR_{nn} and MOD28R_{mm} with the center week matching the eight day processing period. Products from PGE53 archived at MODAPS are the Oceans Daily MODOCD_{nn} (where nn = parameters 1...36) and MOD28D_{mm} (where mm = parameters D1, D2, N1, N2) and the corresponding Daily Ocean Maps $\text{M}\{04,36,1D\}\{M,S,N,Q,F,1,2,3\}D_{##}$ (where $##$ = parameters 1...36 for Ocean Color products and D1, D2, N1, N2 for SST products). MODAPS exports MODOCD_{nn} , MOD28D_{mm} and $\text{MO}\{04,36,1D\}\{M,S,N,Q,F,1,2,3\}D_{##}$ to the PDR Server for archive and distribution at the GSFC DAAC.

Production Rules

PGE53 runs after one day of L3 Oceans Interim Daily (PGE20) and the corresponding L3 Ocean 24-Day (3-Week) Reference (PGE50) outputs are completed. The operational scenario is nominally 40 activations per day, representing the processing of one of L3 Ocean Color daily parameters or one L3 Ocean SST parameters in either the day or night mode per PGE execution. Thus, 40 profiles are required for PGE53, one for each parameter. The Period Specification Production Rule is required for PGE53 to acquire the L3 Interim Daily products and to generate the daily L3 Ocean Color and SST quality controlled products.

The required inputs are matching parameter sets from the daily Ocean data sets (MODOCA_{nn} and MOD28A_{mm}) and the 24-day reference data sets (MODOCR_{nn} and MOD28R_{mm}). The Advanced Temporal and Data Day Production Rules are required to acquire the L3 Ocean 24-Day Reference products. A negative delta time is applied to the start of the daily processing period and a positive delta time is applied to the end of the daily processing period. The delta time must be sufficient to cover the start dataday under which the 3 week reference file is archived. The algorithms for setting the delta times in the start and end of the data processing period for these ancillary data sets are described in Section 5.8, Advanced Temporal Production Rule.

The Data Day Production Rule, which is a special implementation of the Runtime Parameters, is used to specify the Data Day corresponding to the processing day. For this Production Rule, MODAPS stages the input granules of the parameter and the day being processed and passes the start dataday and end dataday to the PGE as Runtime Parameters.

PGE53 also produces map images for each of the 40 ocean parameters. The map for each ocean parameter includes eight types of values and three resolutions or sizes. The L2 Flag, Byte 3 is only produced for parameters 13 through 25.

The Production Rules for PGE53 are:

Period Specification,
Advanced Temporal,
Data Day,
Runtime Parameters.

Data Files

Static Input ESDT

MODOCSPC	MODIS/Terra Ocean Space Converter Parameters
MODOCMAP	MODIS/Terra Oceans Mapper Parameters

Dynamic Product Input ESDT

One of the following for each PGE profile activation:

MODOCA _{nn}	MODIS/Terra Ocean Color Time-Binned Interim Params 1-36 Daily L3 Global 4km ISEAG (where nn = parameters 1...36) (R) 1*
MOD28A _{mm}	MODIS/Terra Sea Surface Temperature Time-Binned Interim Params 1-4 Daily L3 Global 4km ISEAG (where mm = parameters D1, D2, N1, N2) (R) 1*

AND one of the following for each PGE profile activation:

MODOCR _{nn}	MODIS/Terra Ocean Color Interim Composite Params 1-36 24-Day L3 Global 4km ISEAG (where nn = parameters 1...36) (R) 1*
MOD28R _{mm}	MODIS/Terra Sea Surface Temperature Interim Composite Params 1-4 24-Day L3 Global 4km ISEAG (where mm = parameters D1, D2, N1, N2) (R) 1*

Dynamic Product Output ESDT

One of the following for each PGE profile activation:

MODOCD _{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Daily L3 Global 4km ISEAG (where nn = parameters 1...36) (A _M) (A _D) 1*
MOD28D _{mm}	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 Daily L3 Global 4km ISEAG (where mm = D1, D2, N1, N2) (A _M) (A _D) 1*

*per parameter

Map Images

MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}D##

MODIS/Terra Ocean Color and SST {Mean} Maps Daily L3 Global {4km} CylEqDis
 {Std. Dev.}{36km}
 {Number}{1Deg}
 {Quality}
 {Common Flags}
 {Flag Byte 1}
 {Flag Byte 2}
 {Flag Byte 3}

(Where: M = MODIS
 O = Oceans
 {04, 36, 1D} = resolution and size:
 04 = 4 km
 36 = 36 km
 1D = 1 Degree
 {M, S, N, Q, F, 1, 2, 3} = values mapped:
 M = Mean
 S = Standard deviation
 N = Number of observations
 Q = Quality
 F = Common flags
 1 = L2 Flag Byte 1
 2 = L2 Flag Byte 2
 3 = L2 Flag Byte 3 (only produced for ## = 13 through 25)
 D = Daily
 ## = 1 through 36 for Ocean Color parameters or D1, D2, N1,
 and N2 for SST parameters.) (A_M) (A_D) 1*

Temporary Product Output Files

MODOCF _{nn}	MODIS/Terra Ocean Color Temporary Composite Params 1-36 Daily L3 Global 4km ISEAG (where nn = parameters 1...36) (used for temporary storage of binned product.) (T _M) 2*
MOD28F _{mm}	MODIS/Terra Sea Surface Temperature Temporary Composite Params 1-4 Daily L3 Global 4km ISEAG (where mm = parameters 1...4)(used for temporary storage of binned product) (T _M) 2*

*per parameter

Dynamic Runtime Parameter for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
end dataday	<End Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
Param	<Parameter to process>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	0
time flag	D
output quality	A
gsfc quality	1
longitude, origin	0.0
latitude, origin	0.0
projection rotation	0.0
longitude, center	0.0
latitude, center	0.0
output image width in degrees	0.0
output image height in degrees	0.0
which quality field	D
threshold	2.0
which quality	F
PGEVersion	<Version of PGE53 that appears in the ciList delivered with the code>

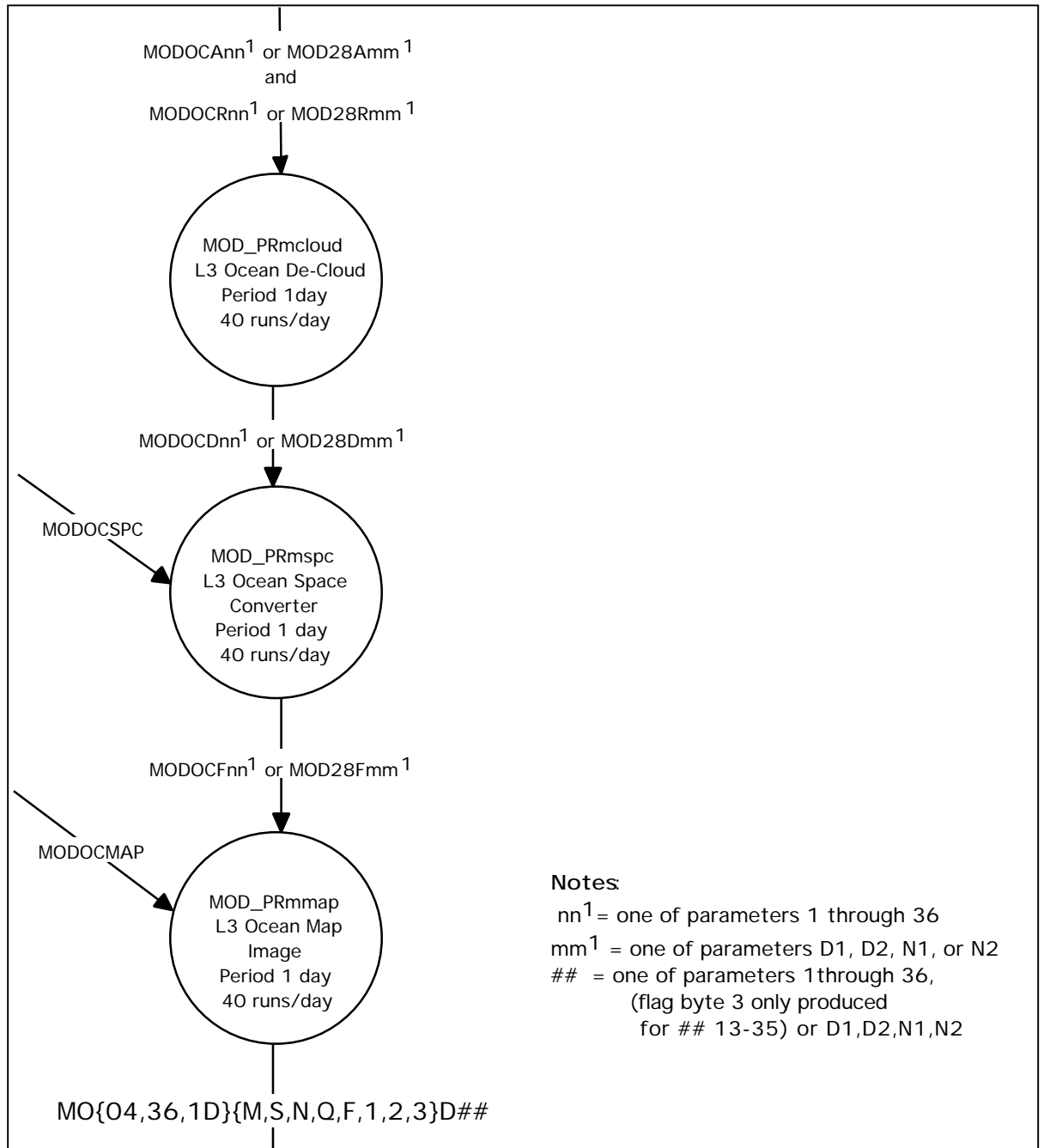


Figure 4-11 PGE53 Structure

4.54. Level 3 8-Day Oceans (PGE54)

PGE54 performs the L3 Oceans 8-day (weekly) processing at MODAPS.

Purpose

PGE54 produces the quality controlled, L3 8-day Ocean Color MODOCW_{nn} (where nn = parameters 1-36), L3 8-day Ocean Sea Surface Temperature (SST) MOD28W_{mm} (where mm = parameters D1, D2, N1, N2) and L3 8-day maps of these products.

Structure

PGE54 consists of the Ocean 8-day (weekly) time binning process (MOD_PRmtbin) and the L3 mapping processes (MOD_PRmspc and MOD_PRmmap). Figure 4-12 shows the structure of PGE54.

MODAPS V1 Production

PGE54 is run in MODAPS V1 Loader MDO4, which is executed every 8 days of Oceans Interim Daily granules covering the 8-day processing period and the corresponding 3-week reference files with the center week matching the 8-day processing period. PGE54 executes at the completion of PGE53 in the same loader when the Ocean Daily granules MODOCD_{nn} (where nn = parameters 1 through 36) and MOD28D_{mm} (where mm = parameters D1, D2, N1, N2) covering the 8-day processing period are generated. Products from PGE54 archived at MODAPS are the Oceans Weekly MODOCW_{nn} (where nn = parameters 1 through 36) and MOD28W_{mm} (where mm = parameters D1, D2, N1, N2) and the corresponding Weekly Oceans maps MO {04, 36, 1D} {M, S, N, Q, F, 1, 2, 3}W_{##} (where ## = parameters 1 through 36 for each Ocean Color product and D1, D2, N1, N2 for SST). MODAPS exports MODOCW_{nn}, MOD28W_{mm}, and MO {04, 36, 1D} {M, S, N, Q, F, 1, 2, 3}W_{##} to the PDR Server for archive and distribution at the GSFC DAAC.

MODAPS V2 Production

PGE54 is run in MODAPS V2 Recipe AM1M_O4b, which is executed every 8 days of Oceans Interim Daily granules covering the 8-day processing period and the corresponding 3-week reference files with the center week matching the 8-day processing period. PGE54 executes at the completion of PGE53 when the Ocean Daily granules MODOCD_{nn} (where nn = parameters 1 through 36) and MOD28D_{mm} (where mm = parameters D1, D2, N1, N2) covering the 8-day processing period are generated.

Products from PGE54 archived at MODAPS are the Oceans Weekly MODOCW_{nn} (where nn = parameters 1 through 36) and MOD28W_{mm} (where mm = parameters D1, D2, N1, N2) and the corresponding Weekly Oceans maps MO {04, 36, 1D} {M, S, N, Q, F, 1, 2, 3}W_{##} (where ## = parameters 1 through 36 for each Ocean Color product and D1, D2, N1, N2 for SST). MODAPS exports MODOCW_{nn}, MOD28W_{mm}, and MO {04, 36, 1D} {M, S, N, Q, F, 1, 2, 3}W_{##} to the PDR Server for archive and distribution at the GSFC DAAC.

Production Rules

PGE54 runs after eight days of L3 Oceans Daily (PGE53) processing has been completed. The operational scenario is nominally 40 activations every 8 days, representing the processing of one of the L3 Ocean Color 8-day parameter products or one of the L3 Ocean SST 8-day parameters in either the day or night mode per PGE execution. Thus, 40 profiles are required for PGE50, one for each parameter. The Period Start of 8 Days Production Rule is required for PGE54. PGE54 will require a "Smart" Start of Year Production Rule at the end of each year. The Oceans PGEs also require a specification for MODAPS to override the default of including the few days of the next year in the product made during the last period of the year.

Nominally eight days of one of the following L3 Oceans daily input products are required: MODOCD_{nn} or MOD28D_{mm}. The Data Days covered in the input and output 8-day products need to be specified using the Data Day Production Rule, which is a special implementation of the Runtime Parameter. For this Production Rule, MODAPS stages the input granules of the parameter being processed according to their Data Day to match the Oceans 8-day output and passes the start dataday and end dataday to the PGE as Runtime Parameters. A Minimum Number of Granules for the required daily input products is specified and a time-out is associated for running PGE54 if the minimum requirements are met.

PGE54 also produces map images for each of the 40 ocean parameters. The map for each ocean parameter includes eight types of values and three resolutions or sizes. The L2 flag, byte 3 is only produced for parameters 13 through 25.

The Production Rules for PGE54 are:

Period Start of 8 Days,

“Smart” Start of Year,

Data Day,

Runtime Parameters,

Minimum Number of Granules.

Data Files

Static Input ESDT

MODOCTB	MODIS/Terra Ocean Time Binner Parameters
MODOCSPC	MODIS/Terra Ocean Space Converter Parameters
MODOCMAP	MODIS/Terra Oceans Mapper Parameters

Dynamic Product Input ESDT

One of the following for each PGE profile activation:

MODOCD _{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Daily L3 Global 4km ISEAG (where nn = parameters 1 through 36) (R) 1*
MOD28D _{mm}	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 Daily L3 Global 4km ISEAG (where mm = parameters D1, D2, N1, N2) (R) 1*

Dynamic Product Output ESDT

One of the following for each PGE profile activation:

MODOCW _{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 8-Day L3 Global 4km ISEAG (where nn = parameters 1 through 36) (A _M) (A _D) 1*
MOD28W _{mm}	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 8-Day L3 Global 4km ISEAG (where mm = parameters D1, D2, N1, N2) (A _M) (A _D) 1*

Map Images

MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}W##

MODIS/Terra Ocean Color and SST {Mean} Maps 8-Day L3 Global {4km} CylEqDis
 {Std. Dev.}{36km}
 {Number}{1Deg}
 {Quality}
 {Common Flags}
 {Flag Byte 1}
 {Flag Byte 2}
 {Flag Byte 3}

(Where: M = MODIS
 O = Oceans
 {04, 36, 1D} = resolution and size:
 04 = 4 km
 36 = 36 km
 1D = 1 Degree
 {M, S, N, Q, F, 1, 2, 3} = values mapped:
 M = Mean
 S = Standard deviation
 N = Number of observations
 Q = Quality
 F = Common flags
 1 = L2 Flag Byte 1
 2 = L2 Flag Byte 2
 3 = L2 Flag Byte 3 (only produced for ## = 13 through 25)
 W = 8-Day weekly
 ## = 1 through 36 for Ocean Color parameters or D1, D2, N1,
 and N2 for SST parameters.) (A_M) (A_D) 1*

Temporary Product Output

MODOCF _{nn}	MODIS/Terra Ocean Color Temporary Composite Params 1-36 8-Day L3 Global 4km ISEAG (where nn = parameters 1 through 36; used for temporary storage of binned product) (T _M) 26*
MOD28F _{mm}	MODIS/Terra Sea Surface Temperature Tempora Composite Params 1-4 8-Day L3 Global 4km ISEAG (where mm = parameters D1, D2, N1, N2; used for temporary storage of binned product) (T _M) 26*

*per parameter

Dynamic Runtime Parameter for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
end dataday	<End Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
Param	<Parameter to process>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	"0"
time flag	"W"
output quality	"A"
gsfc quality	"1"
longitude, origin	"0.0"
latitude, origin	"0.0"
projection rotation	"0.0"
longitude, center	"0.0"
latitude center	"0.0"
output image width in degrees	"0.0"
output image height in degrees	"180.0"
which quality field	"D"
PGEVersion	<Version of PGE54 that appears in the ciList delivered with the code>

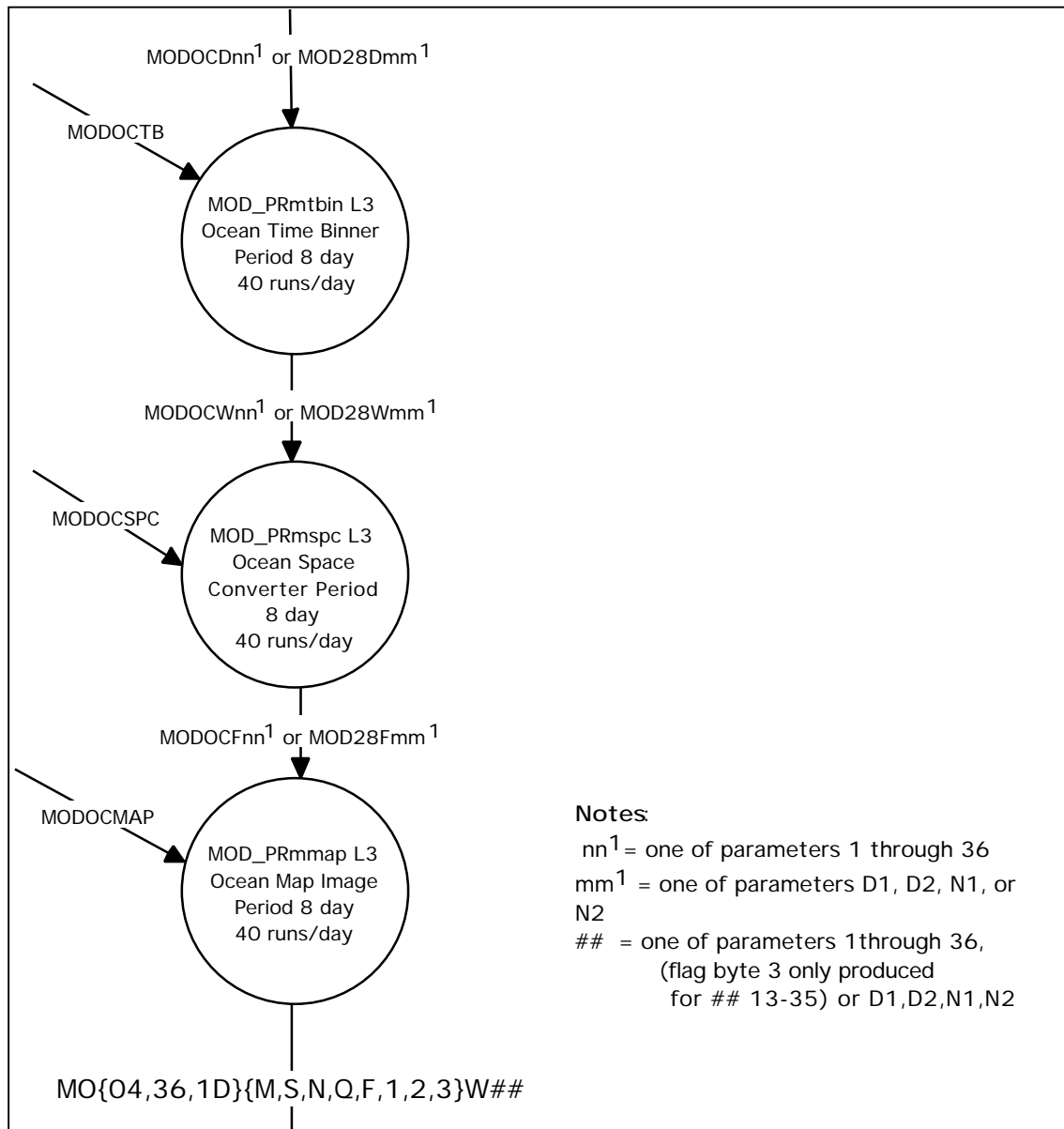


Figure 4-12 PGE54 Structure

4.55. Level 3 Daily Clear Sky (PGE55)

PGE55 will perform the L3 Daily Clear Sky processing at GSFC.

Purpose

PGE55 produces L3 Daily Clear Sky Radiance products (MODCSR_D and MODCSR_8).

Structure

PGE55 consists of the L3 Clear Sky Daily process (MOD_PRCR).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE55.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE55.

Production Rules

The operations scenario is one activation every day. The Period Specification Production Rule is used for the daily activation. The required input is MODCSR_G, which is a daily granule of clear sky radiances produced by MOD_PR35 (PGE03). Once daily output granules of clear sky radiance (MODCSR_D) are created, the seven previous days of daily clear sky radiance granules are input to PGE55 to produce the 8-day product. A Minimum Number of Granules and associated time-out is set at the PGE registration for running without all of the required input. The Advanced Temporal Production rule is used to retrieve previous granules. The algorithms for setting the delta times in the start and end of the data processing period for these ancillary data sets are described in Section 5.8, Advanced Temporal Production Rule. A running L3 interim 8-day composite of Clear Sky Radiances (MODCSR_8) is produced from the 8-daily granules. The 8-day composite clear sky radiance is to be input to Cloud Masks/Profiles (PGE03).

The basic Production Rules for PGE55 are:

Period Specification,
Advanced Temporal,
Minimum Number of Granules.

Data Files**Dynamic Product Input ESDT**

MODCSR_G	MODIS/Terra Clear Sky Radiance Statistics 5-Min L2 25km (R) *
MODCSR_D	MODIS/Terra Clear Sky Radiance Statistics Daily L3 Global 25km CMG (Previous) (R) *

Dynamic Product Output ESDT

MODCSR_D	MODIS/Terra Clear Sky Radiance Statistics Daily L3 Global 25km CMG (A_D) 1
MODCSR_8	MODIS/Terra Clear Sky Radiance Statistics 8-Day L3 Global 25km CMG (A_D) 1

* The MODIS Science Team has not delivered PGE55; the minimum number of files required for production is unavailable.

4.56. Level 3 Daily Atmosphere (PGE56)

PGE56 performs the L3 Daily Atmosphere processing at MODAPS.

Purpose

PGE56 produces L3 Daily Aerosol Cloud Water Vapor Ozone Product (MOD08_D3) and the corresponding high resolution product (MOD08D3H).

Structure

PGE56 consists of the L3 Atmosphere Daily process (MOD_PR08D) and corresponding high resolution process (MOD_PR08DH). These processes run independently the same PGE.

MODAPS V1 Production

PGE56 is run in MODAPS V1 Loader MDA3, which is executed every day upon the availability of up to 36 zonal tiles of MOD08_TL covering the processing period. Products archived at MODAPS are daily granules of MOD08_D3 and MOD08D3H for the GMT Day of the processing period. MODAPS exports MOD08_D3 to the PDR Server for archive and distribution at the GSFC DAAC.

MODAPS V2 Production

PGE56 is run in MODAPS V2 Recipe AM1M_A3, which is executed every day upon the availability of up to 36 zonal tiles of MOD08_TL covering the processing period. Products archived at MODAPS are daily granules of MOD08_D3 and MOD08D3H for the GMT Day of the processing period. MODAPS exports MOD08_D3 to the PDR Server for archive and distribution at the GSFC DAAC.

Production Rules

PGE56 runs after one day of 36 atmosphere zonal tiles (PGE69) outputs are produced. The operational scenario is nominally one activation per day, representing the input of 36 zonal tiles to produce one L3 daily atmospheric granule per PGE execution. The Period Specification Production Rule is required for PGE56 to generate the daily products.

The L3 Atmosphere daily product (MOD08_D3) is created from daily zonal tile file inputs. MOD_PR08D and MOD_PR08DH read the MOD08_TL and MOD08TLH zonal tile files, respectively; and perform the data processing on the tiles for the day. This

process fills the science data arrays, writes the ECS metadata, and writes the MOD08_D3 product file and the high resolution product MOD08D3H.

The production system stages all granules whose temporal coverage overlaps the specified GMT data day. PGE56 runs if all 36 zonal tiles are available. Otherwise production should wait for further instructions from the Science Team. A minimum of one granule each of MOD08_TL and MOD08TLH is required for input to PGE56. No more than 36 zonal tiles may be staged.

The Production Rules for PGE56 are:

Period Specification

Minimum Number of Granules

Data Files

Dynamic Product Input ESDT

MOD08_TL	MODIS/Terra Atmosphere Zonal Tiling Daily L3
	Latitude Zone 1 Deg CMG (R) 1
MOD08TLH	MODIS/Terra Atmosphere Zonal Tiling Daily L3
	Latitude Zone 0.1Deg CMG (R) 1

Dynamic Product Output ESDT

MOD08_D3	MODIS/Terra Aerosol Cloud Water Vapor Ozone
	Daily L3 Global 1Deg CMG (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MOD08D3H	MODIS/Terra Aerosol/Water Vapor/Cloud Daily L3
	Global 0.1 Deg CMG (I _M) 1

Dynamic Runtime Parameters for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
end dataday	<End Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

PGEVERSION	<Version of PGE56 that appears in the ciList delivered with the code>
REPROCESSINGACTUAL	processed once
REPROCESSING PLANNED	further update is anticipated
MetadataEnd	None
LOCALVERSIONID	003

4.57. Level 3 Monthly Atmosphere (PGE57)

PGE57 performs the L3 calendar Monthly Atmosphere processing at MODAPS.

Purpose

PGE57 produces L3 Monthly Aerosol Cloud Water Vapor Ozone product (MOD08_M3).

Structure

PGE57 consists of the L3 Atmosphere Monthly process (MOD_PR08M).

MODAPS V1 Production

PGE57 is run in MODAPS V1 Loader MDA5, which is executed every calendar month upon the availability of all the MOD08_D3 granules that are expected for coverage of this processing period. Products archived at MODAPS are monthly granules of MOD08_M3 for the month of the processing period. MODAPS exports MOD08_M3 to the PDR Server for archive and distribution at the GSFC DAAC.

MODAPS V2 Production

PGE57 is run in MODAPS V2 Recipe AM1M_A5, which is executed every calendar month upon the availability of all the MOD08_D3 granules that are expected for coverage of this processing period. Products archived at MODAPS are monthly granules of MOD08_M3 for the month of the processing period. MODAPS exports MOD08_M3 to the PDR Server for archive and distribution at the GSFC DAAC.

Production Rules

PGE57 runs after one calendar month of L3 Atmosphere Daily (PGE56) outputs are completed. The operational scenario is nominally one activation every month, representing the processing of one month of daily atmosphere granules of MOD08_D3 per PGE execution. The Period Specification Production Rule is required for PGE57 to generate the monthly atmosphere MOD08_M3 product.

The L3 Atmosphere monthly product (MOD08_M3) is created from daily MOD08_D3 file inputs. MOD_PR08M reads the MOD08_D3 files, and performs the data processing on the daily granules for the month. This process fills the science data arrays, writes the ECS metadata, and writes the MOD08_M3 product file.

The required input is a minimum of one granule of MOD08_D3. The Production System stages all daily MOD08_D3 granules whose temporal coverage falls within the calendar

month. PGE57 runs if all of the daily files are available. Otherwise the production system should wait for further instruction from the Science Team.

The Production Rules for PGE57 are:

Period Specification

Minimum Number of Granules

Data Files

Dynamic Product Input ESDT

MOD08_D3	MODIS/Terra Aerosol Cloud Water Vapor Ozone
	Daily L3 Global 1Deg CMG (R) 1

Dynamic Product Output ESDT

MOD08_M3	MODIS/Terra Aerosol Cloud Water Vapor Ozone
	Monthly L3 Global 1Deg CMG (A _M) (A _D) 1

Dynamic Runtime Parameters for Operations

start dataday	<Start Day for Data Observations
end dataday	<End Day for Data Observations
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM-1, PM-1}>

Static Runtime Parameters for Operations

PGEVERSION	<Version of PGE57 that appears in the ciList delivered with the code>
REPROCESSINGACTUAL	processed once
REPROCESSINGPLANNED	further update is anticipated
SizeMetadataEnd	None
LOCALVERSIONID	003

4.58. Level 3 8-Day Land Surface Temperature CMG (PGE58)

PGE58 performs the 8-day CMG Land Surface Temperature (LST) processing at MODAPS.

Purpose

PGE58 produces CMG 8-day LST/Emissivity product (MOD11C2) and the Land QA product (MODLM_QA).

Structure

PGE58 consists of the CMG LST/Emissivity 8-day process (MOD_PR11C2) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODAPS Science Team has not yet delivered PGE58.

MODAPS V2 Production

The MODAPS Science Team has not yet delivered PGE58.

Production Rules

PGE58 runs after the 8-day L3 LST/Emissivity product (MOD11A2) consisting of 338 land tiles from PGE31 has been produced. The operational scenario is nominally one activation every 8 days. The Period Start of 8 Days Production Rule is required for PGE58. PGE58 will require a “Smart” Start of Year Production Rule at the end of each year.

The required input is MOD11A2. This tiled input product has both day and night mode data. Products for the two modes were not generated separately for the 8-day MOD11A2 from PGE31 since the input to PGE31 was not separated. Thus, the MOD11C2 product will have both day and night modes. The gridded MOD11C2 product is generated from all of the available 338 8-day land tiles of MOD11A2. A Minimum Number of Granules, representing the number of 8-day tiles, is specified for MOD11A2 and a time-out is associated for running PGE58 if the minimum requirements are met.

The Production Rules for PGE58 are:

Period Start of 8 Days,
“Smart” Start of Year,
Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD11A2	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 1 km ISIN Grid (R) *
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Dynamic Product Output ESDT

MOD11C2	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 56 km CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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*The MODIS Science Team has not delivered PGE58; the minimum number of files required for production is unavailable.

4.59. Level 3 32-Day Land Surface Temperature CMG (PGE59)

PGE59 performs the 32-Day CMG Land Surface Temperature (LST) processing at MODAPS.

Purpose

PGE59 produces the CMG 32-day LST/Emissivity product (MOD11C3) and the Land EDC QA product (MODLM_QA).

Structure

PGE59 consists of the CMG LST 32-day process (MOD_PR11C3) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE 59.

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE 59.

Production Rules

PGE59 runs after four 8-day sets of L3 LST products (MOD11B2), consisting of 338 land tiles from PGE31, have been produced. The operational scenario is nominally one activation every 32 days. The Period Start of 32 Days Production Rule is required for PGE59. PGE59 will require a “Smart” Start of Year Production Rule at the end of each year.

The required input is MOD11A2. This tiled input product has both day and night mode data. Products for the two modes were not generated separately for the 8-day MOD11A2 from PGE31 since the input to PGE31 was not separated. Thus, the MOD11C3 product will have both day and night modes in the same gridded granule. The gridded MOD11C3 product is generated from all of the available 338 8-day tiles of MOD11A2. A Minimum Number of Granules, representing the number of 8-day tiles, is specified for MOD11A2 and a time-out is associated for running PGE59 if the minimum requirements are met.

The Production Rules for PGE59 are:

Period Start of 32 Days,

“Smart” Start of Year,

Minimum Number of Granules.

Data Files**Dynamic Product Input ESDT**

MOD11A2	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 1 km ISIN Grid (R) *
---------	---

Dynamic Product Output ESDT

MOD11C3	MODIS/Terra Land Surface Temperature/Emissivity 32-Day L3 Global 56 km CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLE_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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*The MODIS Science Team has not delivered PGE59; the minimum number of files required for production is unavailable.

4.60. Geolocation Control Point (PGE60)

PGE60 performs the L2 Geolocation Control Point matching, which is performed with each MOD03 input file at MODAPS. This results in 288 executions of this PGE per day executed at MODAPS. Each output data granule covers a period of five minutes. The PGE nominally outputs 288 granules of each product per day. The geolocation control point residuals product contains measured and observed positions of land chip and island control points. These are used in Geolocation analysis to improve the accuracy of future Geolocation products (MOD03).

Purpose

PGE60 determines the observed location of land chip and island control points and produces Geolocation Control Point Residuals product (MOD03CP).

Structure

PGE60 is comprised of a single processing step; MOD_PR03CP performs control point matching with control point images visible in the MODIS L1B product. Cloud Mask, Snow, and Sea Ice products are used to exclude control point images that may be obscured.

MODAPS V1 Production

PGE60 is run in MODAPS V1 Loader MDL1, which is executed every 5-minutes upon the availability of all of the Geolocation Fields (MOD03), L1B radiances; and Cloud Mask granules that are expected for the processing period. When the Loader has completed the production of the Snow and Sea Ice products, it runs PGE60. The output MOD03CP is an Interim product at MODAPS.

MODAPS V2 Production

PGE60 is run in MODAPS V2 Recipe AM1M_L1, which is executed every 5-minutes upon the availability of all of the Geolocation Fields (MOD03), L1B radiances; and Cloud Mask granules that are expected for the processing period. When the Loader has completed the production of the Snow and Sea Ice products, it runs PGE60. The output MOD03CP is an Interim product at MODAPS.

Production Rules

PGE60 is data driven and is executed when new MOD03, L1B, and MOD35_L2 data are available, approximately every five minutes.

The required input for PGE60 is MOD03. Either MOD02HKM or MOD02QKM are desired, but PGE60 will run without either of them. The MOD02HKM and MOD02QKM files are not substitutes for each other; PGE60 uses both if both are available, but can still usefully run with reduced effectiveness if one or both is missing. MOD_PR03CP will also use L2 Snow and Sea Ice products to perform obscuration exclusion, if available. The MOD10_L2 MOD29 and MOD35_L2 inputs are optional. Only MOD29 daytime data are to be staged; the DayNightFlag for MOD29 files should be either "Day" or "Both".

Inputs to the current version of MOD_PR03CP include an island library file containing a list of island central positions determined from World Vector Shoreline data and over one hundred land control point "chip" files.

PGE60 is executed when the required MOD03 are available and the wait time has expired for the optional ESDT inputs. A wait time is set for the optional inputs of MOD02HKM, MOD02QKM, MOD10_L2, MOD29, and MOD35_L2 to be available.

The Production Rules for PGE01 are:

Basic Temporal,
Optional Inputs.

Data Files

Static Input ESDT

MODCPLUT	MODIS/Terra Parameters and Control Point Library files for production of MOD03CP
----------	--

Dynamic Product Input ESDT

MOD02HKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 500 m (O) 0
MOD02QKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250 m (O) 0
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1

MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (O) 0
MOD10_L2	MODIS/Terra Snow Cover 5-Min L2 Swath 500m (O) 0
MOD29	MODIS/Terra Sea Ice Extent 5-Min L2 Swath 1km (O) 0

Quality Control Output ESDT

MOD03CP	MODIS/Terra Geolocation Control Point Residuals 5- Min L2 50m (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
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Static Runtime Parameters for Operations

Source for spacecraft kinematic state	MODIS Packet
Search for land control points	1
Search for single islands	0
Search for island triplets	0
Use Cloud Mask input file	0
Use Sea Ice input file	1
Use Snow Cover input file	1
MOD_PRO3CP Version	<Version of PGE60 that appears in ciList delivered with the code>; to be implemented in the future.

4.61. Level 4 Yearly Vegetation Continuous Fields (PGE61)

PGE61 performs the L4 Yearly 1km Vegetation Continuous Fields processing at MODAPS.

Purpose

PGE61 produces the L4 Yearly 1km Vegetation Continuous Fields (MOD44B) and the Land QA product (MODLM_QA).

Structure

PGE61 consists of the L4 Yearly 1km Vegetation Continuous Fields process (MOD_PR44B) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE61.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE61.

Production Rules

PGE61 runs after a year of L4 16-Day Vegetation Intermediate Composite products from PGE72 have been generated. The operational scenario is a maximum of 338 activations every year, representing the processing of one Land tile per PGE execution. The Period Specification Production Rule is required for PGE61. The required inputs are MOD44CQ and MOD44CH. Since the PGE has not been delivered, it is uncertain whether both the 250m and 500m input products will be required or just one of these.

PGE61 requires the Latitude/Longitude Tiling Production Rule. To execute PGE61, a Latitude/Longitude tile definition file must be associated with the PGE. MODAPS passes the TILEID to PGE61 as a dynamic runtime parameter.

Five tiling schemes were used to produce all of the input products. These five tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Surface Reflectance products. Since MODAPS combines the tile schemes into one file, only one profile of PGE 61 is required. The Minimum Number of Granules for PGEs that run one tile at a time and use inputs of multiple day products may be set to the usual default value of 1 or may be set to a value greater than 1.

The Production Rules for PGE61 are:

- Period Specification
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1)

Data Files

Dynamic Product Input ESDT

MOD44CQ	MODIS/Terra Vegetation Intermediate Composite 16-Day L4 Global 250m ISIN Grid (R)*
MOD44CH	MODIS/Terra Vegetation Intermediate Composite 16-Day L4 Global 500m ISIN Grid (R)*

Dynamic Product Output ESDT

MOD44B	MODIS/Terra Vegetation Continuous Field Yearly L4 Global 1km ISIN Grid (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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* The MODIS Science Team has not delivered PGE61; the number of files required is unavailable.

4.62. Level 3 32 -Day Thermal Anomalies/Fire CMG (PGE62)

PGE62 performs the 32-Day CMG Thermal Anomalies/Fire processing at MODAPS.

Purpose

PGE62 produces the CMG 32-Day Thermal Anomalies/Fire product (MOD14C3) and the Land QA product (MODLM_QA).

Structure

PGE62 consists of the 32-Day CMG Thermal Anomalies/Fire process (MOD_PR14C) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE62.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE62.

Production Rules

PGE62 runs after all the L3 daily gridded thermal anomalies (MOD14A1) products from PGE29 have been generated for the 32-day period.. The operational scenario is nominally one activation every 32 days. The Period Specification Production Rule is required for PGE62.

The required input is MOD14A1, which has been generated with day and night mode data together. Thus, the MOD14C3 is produced together in day mode and night mode.

The gridded MOD14C3 product is generated from all of the available 338 daily Land tiles of MOD14A1. A Minimum Number of Granules, representing the number of tiles, is specified for MOD14A1 and a time-out is associated for running PGE62 if the minimum requirements are met.

The Production Rules for PGE62 are:

- Period Start of 32 Days
- "Smart" Start of Year
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD14A1	MODIS/Terra Thermal Anomalies/Fire Daily L3 Global 1km ISIN Grid (R) *
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Dynamic Product Output ESDT

MOD14C3	MODIS/Terra Thermal Anomalies/Fire 32-Day L3
	Global 28km CMG (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MODLE_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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* The MODIS Science Team has not delivered PGE62; the number of files required is unavailable.

4.63. Level 4 Monthly Leaf Area Index/FPAR CMG (PGE63)

PGE63 performs the monthly CMG Leaf Area Index (LAI)/FPAR processing at MODAPS.

Purpose

PGE63 produces the CMG monthly LAI/FPAR Product (MOD15CM) and the Land QA product (MODLM_QA).

Structure

PGE63 consists of the CMG LAI/FPAR Monthly process (MOD_PR15CM) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE63.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE63.

Production Rules

PGE63 runs after four 8-day sets of L4 LAI/FPAR Land tiles (MOD15A2) from PGE34 have been produced. The operational scenario is nominally one activation every calendar month. The Period Specification Production Rule is required for PGE63.

The required input is MOD15A2, which has been generated only in day mode. Thus, the output product MOD15C2 is produced only in day mode. The gridded MOD15C2 product is generated from all of the available 338 8-day land tiles of MOD15A2. A Minimum Number of Granules, representing the number of 8-day tiles, is specified for MOD15A2 and a time-out is associated for running PGE63 if the minimum requirements are met.

The Production Rules for PGE63 are:

Period Specification

Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD15A2	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 1km ISIN Grid (R) *
---------	---

Dynamic Product Output ESDT

MOD15C2	MODIS/Terra Leaf Area Index/FPAR	Monthly	L4
	Global 56km CMG (A_M) (A_D)	1	

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance	(I_M)	1
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*The MODIS Science Team has not delivered PGE63; the number of files required is unavailable.

4.64. Level 4 Yearly Net Primary Production CMG (PGE64)

PGE64 performs the yearly CMG Net Primary Production (NPP) processing at MODAPS.

Purpose

PGE64 produces CMG yearly NPP product (MOD17C3) and the Land QA product (MODLM_QA).

Structure

PGE64 consists of the CMG NPP Yearly process (MOD_PR17C3) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE64.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE64.

Production Rules

PGE64 runs after the 338 yearly land tiles of L4 NPP products (MOD17A3) from PGE38 have been produced. The operational scenario is nominally one activation every year. The Period Specification Production Rule is required for PGE64.

The required input is MOD17A3 which has been generated only in day mode. Thus, the output product MOD17C3 is produced only in day mode. The gridded MOD17C3 product is generated from all of the available 338 yearly land tiles of MOD17A3. A Minimum Number of Granules, representing the number of yearly tiles, is specified for MOD17A3 and a time-out is associated for running PGE64 if the minimum requirements are met.

The Production Rules for PGE64 are:

Period Specification,
Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD17A3	MODIS/Terra Net Primary Production Yearly L4 Global 1km ISIN Grid (R) *
---------	--

Dynamic Product Output ESDT

MOD17C3	MODIS/Terra Net Primary Production Yearly L4
	Global 56km CMG (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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* The MODIS Science Team has not delivered PGE64; the number of files required is unavailable.

4.65. *Level 3 32-Day Bi-Directional Reflectance Distribution Function/Albedo CMG (PGE65)*

PGE65 performs the 32-day CMG Bi-Directional Reflectance Distribution Function (BRDF)/Albedo processing at MODAPS.

Purpose

PGE65 produces the CMG 32-day BRDF/Albedo product (MOD43C2) and the Land QA product (MODLE_QA).

Structure

PGE65 consists of the CMG BRDF/Albedo 32-day process (MOD_PR43C) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE65.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE65.

Production Rules

PGE65 runs after two 16-day sets of L3 BRDF/BARS (MOD43B1 and MOD43B2) from PGE23 have been produced. The operational scenario is nominally one activation every 32 days. The Period start of 32 Days Production Rule is required for PGE65. PGE65 will require a "Smart" Start of Year Production Rule at the end of each year.

The required inputs are MOD43B1 and MOD43B2, which have been generated only in day mode. Thus, the output product MOD43C2 is produced only in day mode. The gridded MOD43C3 product is generated from all of the available 338 16-day land tiles of MOD43B1 and MOD43B2. A Minimum Number of Granules, representing the number of 16-day tiles, is specified for MOD43B1 and MOD43B2 and a time-out is associated for running PGE65 if the minimum requirements are met.

The Production Rules for PGE65 are:

Period Start of 32 Days

- "Smart" Start of year

Minimum Number of Granules.

Data Files**Dynamic Product Input ESDT**

MOD43B1	MODIS/Terra BRDF/Albedo Model-1 16-Day L3 Global 1km ISIN Grid (R) *
MOD43B2	MODIS/Terra BRDF/Albedo Model-2 16-Day L3 Global 1km ISIN Grid (R) *

Dynamic Product Output ESDT

MOD43C2	MODIS/Terra BRDF/Albedo 32-Day L3 Global 28km CMG (A_M) (A_D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I_M) 1
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*The MODIS Science Team has not delivered PGE65; the number of files required is unavailable.

4.66. Level 4 32-Day Vegetation Cover Conversion 250m (PGE66)

PGE66 performs the L4 32-Day 250m Vegetation Cover Conversion processing at UMD.

Purpose

PGE66 produces L4 32-Day 250m Vegetation Cover Conversion product (MOD44A) and the Land QA product (MODLM_QA).

Structure

PGE66 consists of the L4 32-Day 250m Vegetation Cover Conversion process (MOD_PR44A) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

PGE66 was not delivered in time for MODAPS V1 production.

MODAPS V2 Production

PGE66 was delivered for testing in MODAPS V2, but the MODIS Science Team at UMD has made radical changes in the PGE and associated products since then. UMD will be running PGE66 and exporting the products to the EDC DAAC. No details are available on production at UMD. The details for MODAPS V2 will not be included since the products are to be made at UMD.

Production Rules

The Production Rules for PGE66 are based upon a potential production at MODAPS. PGE66 runs after the two 16-Day Vegetation Intermediate Composite sets of tiled granules at 250m (MOD44CQ) have been produced by PGE72. The operational scenario is nominally 338 activations every 32 days, representing the processing of one land tile per PGE execution. Due to restrictions of percent of data products to be produced, the actual number of tiles included for PGE66 may be less than 338. The Period Start of 32 Days Production Rule is required for PGE66. PGE66 will require a "Smart" Start of Year Production Rule at the end of each year.

PGE66 requires the Latitude/Longitude Tiling Production Rule. To execute PGE66, a Latitude/Longitude tile definition file must be associated with the PGE. Since PGE66 now obtains the TileID from the input products, the data processing system does not need to set the TileID as a dynamic routine parameter.

Five tiling schemes were used to produce the vegetation intermediate composite in PGE72. These five tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Surface Reflectance products. In general, MODIS PGEs requiring the Latitude/Longitude Tiling Production Rule have Minimum Number of Granules set to one as a default for the registered input products. Since MODAPS combines the tile schemes into one file, only one profile of PGE66 is required.

The required input for the new version of PGE66 is MOD44CQ.

The Production Rules for PGE66 are:

- Period Start of 32 Days,
- “Smart” Start of Year,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules (defaulted to 1).

Data Files

Static Input ESDT

MOD44LUT	MODIS/Terra LUTs for Production of MOD44 products
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Dynamic Product Input ESDT

MOD44CQ	MODIS/Terra Vegetation Intermediate Composite 16-Day L4 Global 250m ISIN Grid (R) *
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Dynamic Product Output ESDT

MOD44A	MODIS/Terra Vegetation Cover Conversion 32-Day L4 Global 250m ISIN Grid (A _U) (A _D) 1
--------	---

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _U) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
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Static Runtime Parameters for Operations

PGE66 Version	<Version of PGE66 that appears in the ciList delivered with the code>
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* The MODIS Science Team has not delivered PGE66; the number of files required is unavailable.

4.67. Level 3 8-Day Snow Cover CMG (PGE67)

PGE67 performs the 8-day CMG Snow Cover processing, at MODAPS.

Purpose

PGE67 produces the CMG 8-day gridded Snow Cover product (MOD10C2) and the Land QA product (MODLM_QA).

Structure

PGE67 consists of the CMG Snow Cover 8-day process (MOD_PR10C2) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE67.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE67.

Production Rules

PGE67 runs after the 130 8-day tiles of gridded snow cover products (MOD10A2) from PGE45 have been produced. The operational scenario is nominally one activation every eight days. The Period Start of 8 Days Production Rule is required for PGE67. PGE67 will require a "Smart" Start of Year Production Rule at the end of each year.

The required input is MOD10A2, which has been generated only in day mode. Thus, the output product MOD10C2 is produced only in day mode. The gridded MOD10C2 product is generated from all of the available 338 8-day land tiles of MOD10A2. A Minimum Number of Granules, representing the number of 8-day tiles, is specified for MOD10A2 and a time-out is associated for running PGE67 if the minimum requirements are met.

The Production Rules for PGE67 are:

Period Start of 8 Days,
"Smart" Start of Year,
Minimum Number of Granules.

Data Files**Dynamic Product Input Esdt**

MOD10A2	MODIS/Terra Snow Cover 8-Day L3 Global 500m ISIN GRID (R) *
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Dynamic Product Output Esdt

MOD10C2	MODIS/Terra Snow Cover 8-Day L3 Global 28km CMG (A _M) (A _D) 1
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Quality Control Or Diagnostic Output Esdt

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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* The MODIS Science Team has not delivered PGE67; the number of files required is unavailable.

4.68. Level 3 8-Day Sea Ice Extent CMG (PGE68)

PGE68 performs the 8-day CMG Sea Ice Extent processing at MODAPS.

Purpose

PGE68 produces CMG 8-day gridded Sea Ice Extent products (MOD29C2D and MOD29C2N) and the Land MODPAS QA product (MODLM_QA).

Structure

PGE68 consists of the CMG Sea-Ice Extent 8-day process (MOD_PR29C2) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

The MODIS Science Team has not yet delivered PGE 68.

MODAPS V2 Production

The MODIS Science Team has not yet delivered PGE 68.

Production Rules

PGE68 runs after the 130 8-day Land tiles of gridded Sea Ice Extent products (MOD29P2D and MOD29P2N) from PGE47 have been produced. The operational scenario is nominally one activation every eight days. The Period Start of 8 Days Production Rule is required for PGE68. PGE68 will require a “Smart” Start of Year Production Rule at the end of each year.

The required inputs are MOD29P2D and MOD29P2N, which have been produced separately in day mode and night mode. Thus, the MOD29C2D and MOD29C2N products are produced separately in day mode and night mode. The gridded MOD29C2D and MOD29C2N products are generated from all of the available 130 8-day land tiles of MOD29P2D and MOD29P2N. A Minimum Number of Granules, representing the number of 8-day tiles, are specified for MOD29P2D and MOD29P2N and a time-out is associated for running PGE68 if the minimum requirements are met.

The Production Rules for PGE68 are:

Period Start of 8 Days

“Smart” Start of Year

Metadata Based Query

Minimum Number of Granules

Data Files

Dynamic Product Input ESDT

MOD29P2D	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1 km EASE-Grid Day (R) *
MOD29P2N	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1 km EASE-Grid Night (R) *

Dynamic Product Output ESDT

MOD29C2D	MODIS/Terra Sea Ice Extent 8-Day L3 Global 28 km CMG Day (A _M) (A _D) 1
MOD29C2N	MODIS/Terra Sea Ice Extent 8-Day L3 Global 28km CMG Night (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 2
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*The MODIS Science Team has not delivered PGE 68; the number of input files required is unavailable.

4.69. Level 3 Daily Atmosphere Zonal Tiling (PGE69)

PGE69 performs the L3 daily Atmospheric Zonal Tiling processing at MODAPS.

Purpose

PGE69 produces the L3 daily Atmosphere Zonal Tiling product (MOD08_TL) and the corresponding high resolution product (MOD08TLH).

Structure

PGE69 consists of the Daily Atmosphere Zonal Tiling processes (MOD_PR08T and corresponding high resolution process MOD_PR08TH). These processes run independently in the same PGE.

MODAPS V1 Production

PGE69 is run in MODAPS V1 Loader MDA2, which is executed for each zonal tile every day upon the availability of MOD04_L2, MOD05_L2, MOD06_L2 and MOD07_L2 granules covering the daily processing period. The daily zonal tile products, MOD08_TL and MOD08TLH, are Interim products at MODAPS. A maximum of 36 zonal tiles of each ESDT is produced each day.

MODAPS V2 Production

PGE69 is run in MODAPS V2 Recipe AM1M_A2, which is executed for each zonal tile every day upon the availability of MOD04_L2, MOD05_L2, MOD06_L2 and MOD07_L2 granules covering the daily processing period. The daily zonal tile products, MOD08_TL and MOD08TLH, are Interim products at MODAPS. A maximum of 36 zonal tiles of each ESDT is produced each day.

Production Rules

PGE69 runs after the production is completed for the L2 Aerosol and Water Vapor (MOD04_L2 and MOD05_L2) from PGE04, L2 atmosphere profiles (MOD07_L2) from PGE03, and the L2 Clouds (MOD06_L2) from PGE06. The operational scenario is nominally 36 activations per day, representing the processing of one atmosphere zonal tile per PGE execution. The Period Specification Production Rule is required for PGE69 to generate the daily zonal tiled products.

MOD_PR08T and MOD_PR08TH open and read all of the 5-minute granules of input L2 aerosol, total precipitable water vapor, cloud product, and atmosphere profiles retrieved for the zonal tile, and perform the data processing to create the tiled output at standard

and high resolution, respectively. These processes fill the science data arrays, write the ECS metadata, and write the MOD08_TL and MOD08TLH tiled product files. MOD04_L2, MOD05_L2, MOD06_L2 and MOD07_L2 are optional inputs. If all expected granules are available, MODAPS executes the PGE. On the order of 20 MOD04_L2 and 40 MOD05_L2, MOD06_L2 and MOD07_L2 are expected. Otherwise MODAPS waits 24 hours and runs when at least one of these files is available.

PGE69 will have 36 profiles, one for each of the zonal tiles. Tile 1 is the North Pole; Tile 36 is the South Pole. The Latitude coordinates for each of the 36 profiles will be specified to the Production System as values for a Metadata Based Query on the NorthBoundingCoordinate and SouthBoundingCoordinate for each of the input ESDTs. Only the granules of each input type whose spatial coverage overlaps the zonal tile and whose temporal coverage overlaps the specified GMT day are staged for the PGE profile being executed. The zonal tile will be a runtime parameter with the appropriate value for each PGE69 profile. MODAPS uses the Zonal Tiling Production Rule to automate the 36 activations per day.

The Production Rules for each PGE69 profile are the following:

Period Specification

Zonal Tiling

Metadata Based Query

Minimum Number of Granules

Data Files

Dynamic Product Input ESDT

MOD04_L2	MODIS/Terra Aerosol 5-Min L2 Swath 10km (O) 0
MOD05_L2	MODIS/Terra Total Precipitable Water Vapor 5-Min L2 Swath 1km and 5km (O) 0
MOD06_L2	MODIS/Terra Clouds 5-Min L2 Swath 1km and 5km (O) 0
MOD07_L2	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km (O) 0

Dynamic Product Output ESDT

MOD08_TL	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone 1Deg CMG (I _M) 1
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Quality Control or Diagnostic Output ESDT

MOD08TLH	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone
	0.1Deg CMG (I _M) 1

Dynamic Runtime Parameters for Operations

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M,PM1M}>
Tile to Process	1-36

Static Runtime Parameters for Operations

PGE69 Version	<Version of PGE69 that appears in the ciList delivered with the code>
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4.70. Level 3 8-Day Atmosphere (PGE70)

PGE70 performs the L3 8-Day Atmosphere processing at MODAPS.

Purpose

PGE70 produces L3 8-Day Aerosol Cloud Water Vapor Ozone product (MOD08_E3).

Structure

PGE70 consists of the L3 Atmosphere 8-Day process MOD_PR08E.

MODAPS V1 Production

PGE70 is run in MODAPS V1 Loader MDA4, which is executed every 8 days upon the availability of all the MOD08_D3 granules that are expected for coverage of this processing period. Products archived at MODAPS are the 8-Day granules of MOD08_E3 for the 8-day processing period. MODAPS exports MOD08_E3 to the PDR Server for archive and distribution at the GSFC DAAC.

MODAPS V2 Production

PGE70 is run in MODAPS V2 Recipe AM1M_A4, which is executed every 8 days upon the availability of all the MOD08_D3 granules that are expected for coverage of this processing period. Products archived at MODAPS are the 8-Day granules of MOD08_E3 for the 8-day processing period. MODAPS exports MOD08_E3 to the PDR Server for archive and distribution at the GSFC DAAC.

Production Rules

PGE70 runs after 8 days of L3 Atmosphere Daily (PGE56) outputs are completed. The operational scenario is nominally one activation every 8 days representing the processing of one cycle of daily atmosphere granules of MOD08_D3 per PGE execution. The Period Start of 8 days Production Rule is required for PGE57 to generate the atmosphere MOD08_E3 product. The PGE70 start day resets to January 1 at the start of each year. The last 8-day period of the prior year is processed using a full complement of 8 inputs.

The L3 Atmosphere 8-Day product (MOD08_E3) is created from daily MOD08_D3 file inputs. MOD_PR08E reads the MOD08_D3 files, and performs the data processing on the daily granules for the 8-day cycle. This process fills the science data arrays, writes the ECS metadata, and writes the MOD08_E3 product file.

The required input is a minimum of one granule of MOD08_D3. The Production System stages all daily MOD08_D3 granules whose temporal coverage falls within the 8-day cycle. PGE70 runs if all 8 daily files are available. Otherwise the Production System waits for approval by the Science Team for manual intervention by the MODAPS Operator.

The Production Rules for PGE70 are:

Start of 8 Days

Minimum Number of Granules

Data Files

Dynamic Product Input ESDT

MOD08_D3	MODIS/Terra Aerosol Cloud Water Vapor Ozone
	Daily L3 Global 1Deg CMG (R) 1

Dynamic Product Output ESDT

MOD08_E3	MODIS/Terra Aerosol Cloud Water Vapor Ozone
	8-Day L3 Global 1Deg CMG (A _M) (A _D) 1

Dynamic Runtime PARAMETERS FOR OPERATIONS

Collection Start Time<Start time for data observations>

Collection End Time<End time for data observations>

SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M,PM1M}>
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Static Runtime Parameters for Operations

PGEVERSION	<Version of PGE70 that appears in the ciList delivered with the code>
REPROCESSINGACTUAL	processed once
REPROCESSINGPLANNED	further update is anticipated
SizeMetadataEnd	None
LOCALVERSIONID	<Value of Collection Version, e.g., 003>

4.71. Level 1A Oceans Sub-setting (PGE71)

PGE71 performs the sub-setting of the MODIS L1A data at the GSFC DAAC.

Purpose

PGE71 produces a modified and compressed 5-minute (MOD01SS) L1A granule from each 5-minute (MOD01) L1A granule. MOD01SS granules are exported to the MODIS Oceans Team at Miami.

Structure

PGE71 consists of the L1A sub-setting process (MOD_PR01SS) that runs in a UNIX script that also compresses the MOD01SS data.

MODAPS V1 Production

Although PGE71 Production is run at the GSFC DAAC, it may also be run in MODAPS in an emergency backup scenario or for testing purposes. PGE71 is run by the MODAPS V1 Loader MD0 after PGE01 generates the 5-minute MOD01 granules. A total of 24 granules of MOD01SS are produced for each 2-hour run of PGE01 followed by PGE71. MOD01SS would be archived at MODAPS only if it is produced at MODAPS.

MODAPS V2 Production

Although PGE71 Production is run at the GSFC DAAC, it may also be run in MODAPS in an emergency backup scenario or for testing purposes. PGE71 is run by the MODAPS V2 Recipe AM1M_0 after PGE01 generates the 5-minute MOD01 granules. A total of 24 granules of MOD01SS are produced for each 2-hour run of PGE01 followed by PGE71. MOD01SS would be archived at MODAPS only if it is produced at MODAPS. The corresponding Aqua product, MYD01SS, is made from Recipe PM1M_0.

Production Rules

The GSFC DAAC processes new Level 0 data that are available from EDOS approximately every two hours. GSFC DAAC runs PGE01 every 15 minutes followed by PGE71. For each 2-hours of Level 0 data, 24 granules of MOD01SS are produced. MOD01 is a required input to PGE71. There are no other data product dependencies for MOD_PR01SS.

PGE71 runs in a UNIX script that executes MOD_PR01SS and then performs a UNIX compression of the MOD01SS granule. MOD_PR01SS sets some of the bands that are

not relevant to the MODIS Oceans products to fill values of -1 . The MOD01SS compressed files are exported to the MODIS Oceans Team at Miami where they are uncompressed for use in the Oceans data processing.

The Production Rules for PGE71 are the following:

Basic Temporal

Data Files

Dynamic Product Input ESDT

MOD01	MODIS/Terra Raw Radiances in Counts 5-Min L1A Swath (R)1
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Dynamic Product Output ESDT

MOD01SS	MODIS/Terra Subsetted Raw Radiances in Counts 5-Min L1A Swath (A _D) 1*
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Dynamic Runtime Parameters For Operations

SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M,PM1M}>
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Static Runtime Parameters for Operations

PGEVersion	<Version of PGE71 that appears in the ciList delivered with the code>
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*per PGE71 execution

4.72. Level 4 16-Day Vegetation Intermediate Composite (PGE72)

PGE72 performs the L4 16-Day 250m and 500m Vegetation Intermediate Composite processing at MODAPS.

Purpose

PGE72 produces the L4 16-Day 250m Vegetation Intermediate Composite at 250m (MOD44CQ) and 500m (MOD44CH), the corresponding metadata composite (MOD44CT), and the Land QA product (MODLM_QA).

Structure

PGE72 consists of the L4 16-Day 250m and 500m Vegetation Intermediate Composite process (MOD_PR44C) and the Land QA process (MOD_PRLQA).

MODAPS V1 Production

PGE72 runs in MODAPS V1 Loader MDL12, which is executed every 16 days upon the availability of all of the expected L2G daily granules of Surface Reflectance, Thermal Anomalies, pointers and geolocation angles, as well as the L3 daily Land Surface Temperature granules. MODAPS runs PGE72 for each of the configured Land tiles configured in the data processing system. Products archived at MODAPS are granules of MOD44CQ and MOD44CH. MODAPS Interim products are MOD44CT and MODLM_QA. MODAPS does not export the products from PGE72 to the DAAC.

MODAPS V2 Production

PGE72 runs in MODAPS V2 Recipe AM1M_L12, which is executed every 16 days upon the availability of all of the expected L2G daily granules of Surface Reflectance, Thermal Anomalies, pointers and geolocation angles, as well as the L3 daily Land Surface Temperature granules. MODAPS runs PGE72 for each of the configured Land tiles configured in the data processing system. Products archived at MODAPS are granules of MOD44CQ and MOD44CH. MODAPS Interim products are MOD44CT and MODLM_QA. MODAPS does not export the products from PGE72 to the DAAC. The corresponding Aqua products MYD44CQ, MYD44CH, and MYD44CT are made in Recipe PM1M_L12.

Production Rules

PGE72 runs after 16 days of L2G pointers and geoangles from PGE12, the L2G daily Surface Reflectance product from PGE11, the L3 Land Surface Temperature product from PGE16, and the L2G daily Thermal Anomalies/Fire product from PGE11 have

been generated. The operational scenario is a maximum of 338 activations every 16 days, representing the processing of one Land tile per PGE execution. The Period Start of 16 Days Production Rule is required for PGE72. PGE72 will require a "Smart" Start of Year Production Rule at the end of each year.

The required inputs are MODPTQKM, MODMGGAD, MOD09GQK, and MOD09GST. The optional inputs are MODPTHKM, MOD09GHK, MOD11A1, and MOD14GD.

PGE72 requires the Latitude/Longitude Tiling Production Rule. To execute PGE72, a Latitude/Longitude tile definition file must be associated with the PGE. MODAPS passes the TILEID to PGE72 as a dynamic runtime parameter.

Five tiling schemes were used to produce all of the input products. These five tiling schemes (shown in Table 4-2) are the same as those used to produce the L2G Surface Reflectance products. Since MODAPS combines the tile schemes into one file, only one profile of PGE 72 is required. The Minimum Number of Granules for PGEs that run one tile at a time and use inputs of daily products may be set to the usual default value of 1 or may be set to a value greater than 1. PGE72 has the value for all required ESDT products set to 1.

The Production Rules for PGE61 are:

- Period Start of 16 Days
- "Smart" Start of Year

Optional Inputs

Latitude/Longitude Tiling,

Runtime Parameters,

Minimum Number of Granules (defaulted to 1).

Data Files

Dynamic Product Input ESDT

MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m ISIN Grid (R) 1
MOD09GQK	MODIS/Terra Surface Reflectance Daily L2G Global 250m ISIN Grid (R) 1
MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km ISIN Grid Day (R) 1
MOD09GST	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km ISIN Grid (R) 1

MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m ISIN Grid (O) 0
MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m ISIN Grid (O) 0
MOD14GD	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km ISIN Grid Day (O) 0
MOD11A1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 1 km ISIN Grid (O) 0

Dynamic Product Output ESDT

MOD44CQ	MODIS/Terra Vegetation Intermediate Composite 16- Day L4 Global 250m ISIN Grid (A _M) 1
MOD44CH	MODIS/Terra Vegetation Intermediate Composite 16- Day L4 Global 500m ISIN Grid (A _M) 1
MOD44CT	MODIS/Terra Vegetation Intermediate Composite Metadata 16-Day L4 Global (I _M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
TILEID	<Tile identification number (value = 8 digit integer that specifies the specific tile within the current requested tile scheme).>

Static Runtime Parameters for Operations

PGE72 Version

<Version of PGE72 that appears in the ciList
delivered with the code>

4.73. Level 3 Monthly Oceans (PGE73)

PGE73 performs the L3 Oceans monthly processing at MODAPS.

Purpose

PGE73 produces the L3 Ocean, quality controlled, monthly composite of Ocean Color parameters 1 through 36 (MODOCM₀₁-MODOCM₃₆), L3 Ocean quality controlled, monthly SST parameters in day and night mode (MOD28M_{D1}, MOD28M_{D2}, MOD28M_{N1}, and MOD28M_{N2}), and L3 monthly maps of these products.

Structure

PGE73 consists of the Ocean monthly time binning process (MOD_PRmtbin) and the L3 mapping processes (MOD_PRmspc and MOD_PRmmap). Figure 4-13 shows the structure of PGE73.

MODAPS V1 Production

PGE73 is run in MODAPS V1 Loader MDO7, which is executed every calendar month depending upon the availability of Oceans daily and weekly granules covering the monthly processing period. PGE73 executes after the completion of PGE53 and PGE54 when the Ocean daily and weekly granules MODOC{D,W}_{nn} (where nn = parameters 1 through 36) and MOD28{D,W}_{mm} (where mm = parameters D1, D2, N1, N2) covering the monthly processing period are generated. Products from PGE73 archived at MODAPS are the Oceans monthly MODOCM_{nn} (where nn = parameters 1 through 36) and MOD28M_{mm} (where mm = parameters D1, D2, N1, N2) and the corresponding monthly Oceans maps MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}M_{##} (where ## = parameters 1 through 36 for each Ocean Color product and D1, D2, N1, N2, for SST. MODAPS exports MODOCM_{nn}, MOD28M_{mm}, and MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}M_{##} to the PDR Server for archive and distribution at the GSFC DAAC.

MODAPS V2 Production

PGE73 is run in MODAPS V2 Recipe AM1M-O7, which is executed every calendar month depending upon the availability of Oceans daily and weekly granules covering the monthly processing period. PGE73 executes after the completion of PGE53 and PGE54 when the Ocean daily and weekly granules MODOC{D,W}_{nn} (where nn = parameters 1 through 36) and MOD28{D,W}_{mm} (where mm = parameters D1, D2, N1, N2) covering the monthly processing period are generated. Products from PGE73

archived at MODAPS are the Oceans monthly MODOCM_{nn} (where nn = parameters 1 through 36) and MOD28M_{mm} (where mm = parameters D1, D2, N1, N2) and the corresponding monthly Oceans maps $\text{MO}\{04, 36, 1D\}\{M, S, N, Q, F, 1, 2, 3\}M_{\#\#}$ (where $\#\#$ = parameters 1 through 36 for each Ocean Color product and D1, D2, N1, N2, for SST. MODAPS exports MODOCM_{nn} , MOD28M_{mm} , and $\text{MO}\{04, 36, 1D\}\{M, S, N, Q, F, 1, 2, 3\}M_{\#\#}$ to the PDR Server for archive and distribution at the GSFC DAAC.

Production Rules

PGE73 runs after the last day of the calendar month of L3 Oceans Daily (PGE53) processing and the complete set of 8-day (weekly) L3 Oceans (PGE54) processing for the calendar month has been completed. The operational scenario is nominally 40 activations every calendar month, representing the processing of one of the L3 Ocean Color monthly parameter products or one of the L3 Ocean SST monthly parameters in either the day or night mode per PGE execution. The Period Specification Production Rule is required for PGE73.

Nominally a calendar month of data from one of the following L3 Oceans daily and weekly input products are required: $\text{MODOC}\{D, W\}_{01}$ - $\text{MODOC}\{D, W\}_{36}$, $\text{MOD28}\{D, W\}_{D1}$, $\text{MOD28}\{D, W\}_{D2}$, $\text{MOD28}\{D, W\}_{N1}$, or $\text{MOD28}\{D, W\}_{N2}$. Weekly products are used in the middle of each month; daily products are used at the beginning and end of each month to round out the monthly output. The Data Days covered in the input and output monthly products need to be specified using the Data Day Production Rule, which is a special implementation of the Runtime Parameter. For this Production Rule, MODAPS stages the input granules of the parameter being processed according to their Data Day to match the Oceans monthly output and passes the start dataday and end dataday to the PGE as Runtime Parameters. A Minimum Number of Granules for the required daily input products is specified and a time-out is associated for running PGE73 if the minimum requirements are met.

PGE73 also produces map images for each of the 40 ocean parameters. The map for each ocean parameter includes eight types of values and three resolutions or sizes. The L2 Flag Byte 3 is only produced for parameters 13 through 25.

The Production Rules for PGE73 are:

Period Specification,
Advanced Temporal
Data Day,

Runtime Parameters,
Minimum Number of Granules.

Data Files

Static Input ESDT

MODOCTB	MODIS/Terra Ocean Time Binner Parameters
MODOCSPC	MODIS/Terra Ocean Space Converter Parameters
MODOCMAP	MODIS/Terra Oceans Mapper Parameters

Dynamic Product Input ESDT

One of the following for each PGE profile activation:

MODOCD _{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Daily L3 Global 4km ISEAG (where nn = parameters 1 through 36) (R) 1*
MOD28D _{mm}	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 Daily L3 Global 4km ISEAG (where mm = parameters D1, D2, N1, N2) (R) 1
MODOCW _{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 8-Day L3 Global 4km ISEAG (where nn = parameters 1 through (36) (R) 1*
MOD28W _{mm}	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 8-Day L3 Global 4km ISEAG (where mm = parameters D1, D2, N1, N2) (R) 1*

Dynamic Product Output ESDT

One of the following for each PGE profile activation:

MODOCM _{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Monthly L3 Global 4km ISEAG (A _M) (A _D) 1*
MOD28M _{mm}	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 Monthly L3 Global 4km ISEAG (Where mm = parameters D1, D2, N1, N2) (A _M) (A _D) 1*

Map Images

MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}M##

MODIS/Terra Ocean Color and SST {Mean} Maps Monthly L3 Global {4km} CylEqDis

{Std. Dev.}{36km}
 {Number}{1Deg}
 {Quality}
 {Common Flags}
 {Flag Byte 1}
 {Flag Byte 2}
 {Flag Byte 3}

(Where:

M = MODIS

O = Oceans

{04, 36, 1D} = resolution and size:

04 = 4 km

36 = 36 km

1D = 1 Degree

{M, S, N, Q, F, 1, 2, 3} = values mapped:

M = Mean

S = Standard deviation

N = Number of observations

Q = Quality

F = Common flags

1 = L2 Flag Byte 1

2 = L2 Flag Byte 2

3 = L2 Flag Byte 3 (only produced for ## = 13 through 25)

M = Monthly

= 1 through 36 for Ocean Color parameters or D1, D2, N1,

and N2 for SST parameters.) (A_M) (A_D) 1*

Temporary Product Output

MODOCF_{nn}

MODIS Terra Ocean Color Temporary Composite Params 1-36
 Monthly L3 Global 4km ISEAG (where nn = parameters 1
 through 36; Interim file used for temporary storage of monthly
 product in PGE73) (T_M) 26*

MOD28F_{mm}

MODIS/Terra Sea Surface Temperature Temporary Params 1-4
 Monthly L3 Global 4km ISEAG (where mm = parameters D1, D2,
 N1, N2; Interim file used for temporary storage of monthly
 product in PGE73) (T_M) 26*

*per parameter

Dynamic Runtime Parameter for Operations

start dataday	<Start Day for Data Observations (yyyyddd)>
end dataday	<End Day for Data Observations (yyyyddd)>
band to map	<Parameter to process>
SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	"0"
time flag	"M"
gsfc quality	"1"
longitude, origin	"0.0"
latitude, origin	"0.0"
projection rotation	"0.0"
longitude, center	"0.0"
latitude center	"0.0"
output image width in degrees	"0.0"
output image height in degrees	"180.0"
which quality field	"D"
PGEVersion	<Version of PGE73 that appears in the ciList delivered with the code>

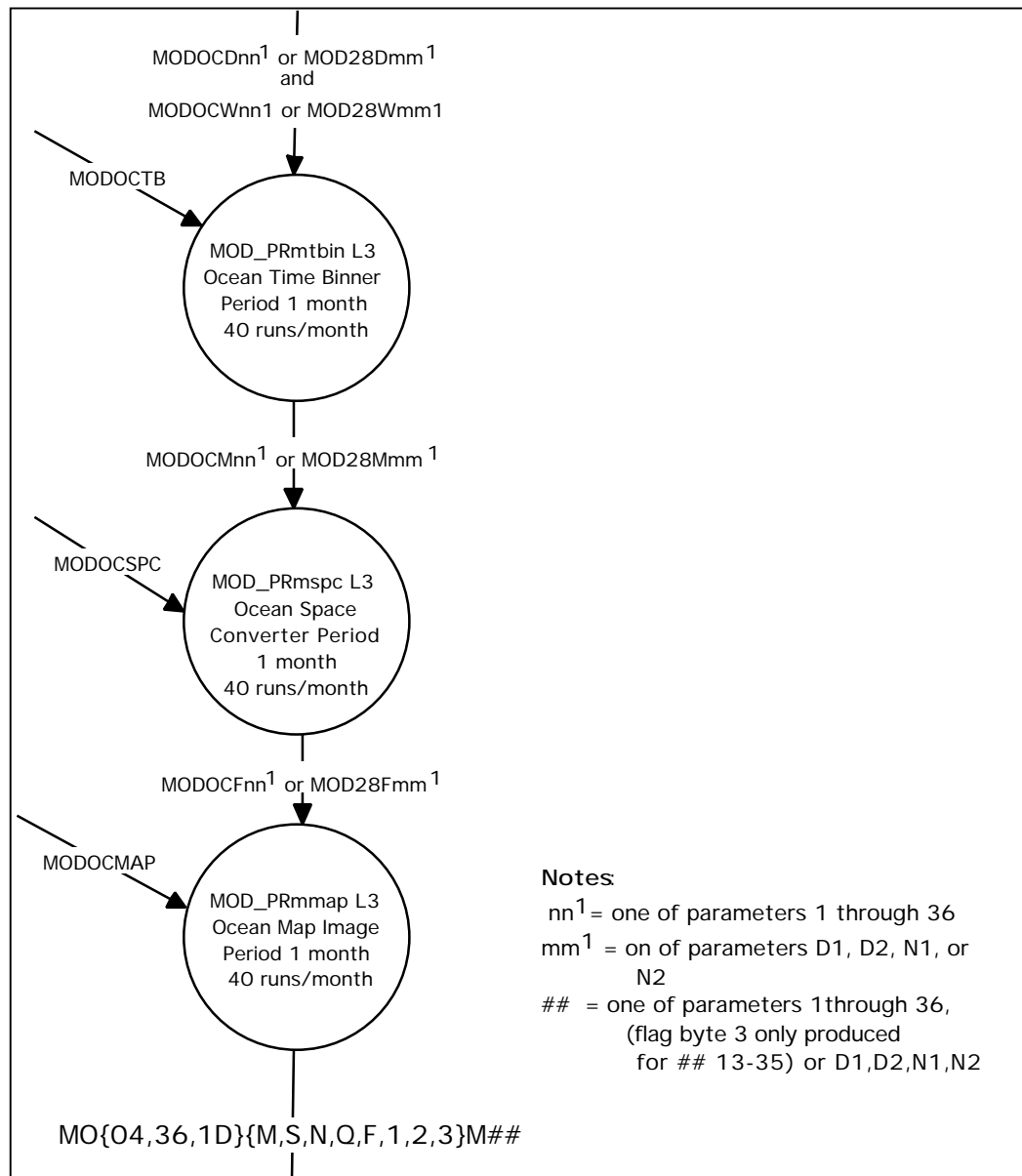


Figure 4-13 PGE73 Structure

4.74. Level 3 Yearly Oceans (PGE74)

PGE74 performs the L3 Oceans yearly processing at MODAPS.

Purpose

PGE74 produces the L3 Ocean, quality controlled, yearly composite of Ocean Color parameters 1 through 36 (MODOCN₀₁-MODOCN₃₆), L3 Ocean, quality controlled, yearly SST parameters in day and night mode (MOD28N_{D1}, MOD28N_{D2}, MOD28N_{N1}, and MOD28N_{N2}), and L3 yearly maps of these products.

Structure

PGE74 consists of the Ocean yearly time binning process (MOD_PRmtbin) and the L3 mapping processes (MOD_PRmspc and MOD_PRmmap). Figure 4-14 shows the structure of PGE74.

MODAPS V1 Production

PGE74 is run in MODAPS V1 Loader MDO8, which is executed every year depending upon the availability of Oceans Monthly granules covering the yearly processing period. PGE74 executes after the completion of PGE73 when the Ocean Monthly granules MODOCM_{nn} (where nn = parameters 1 through 36) and MOD28M_{mm} (where mm = parameters D1, D2, N1, N2) covering the yearly processing period are generated. Products from PGE74 archived at MODAPS are the Oceans Yearly MODOCN_{nn} (where nn = parameters 1 through 36) and MOD28N_{mm} (where mm = parameters D1, D2, N1, N2) and the corresponding Yearly Oceans maps MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}N_{##} (where ## = parameters 1 through 36 for each Ocean Color product and D1, D2, N1, N2, for SST). MODAPS exports MODOCN_{nn}, MOD28N_{mm}, and MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}N_{##} to the PDR Server for archive and distribution at the GSFC DAAC.

MODAPS V2 Production

PGE74 is run in MODAPS V2 Recipe AM1M_O8, which is executed every year depending upon the availability of Oceans Monthly granules covering the yearly processing period. PGE74 executes after the completion of PGE73 when the Ocean Monthly granules MODOCM_{nn} (where nn = parameters 1 through 36) and MOD28M_{mm} (where mm = parameters D1, D2, N1, N2) covering the yearly processing period are

generated. Products from PGE74 archived at MODAPS are the Oceans Yearly MODOCN_{nn} (where nn = parameters 1 through 36) and MOD28N_{mm} (where mm = parameters D1, D2, N1, N2) and the corresponding Yearly Oceans maps MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}N_{##} (where ## = parameters 1 through 36 for each Ocean Color product and D1, D2, N1, N2, for SST). MODAPS exports MODOCN_{nn}, MOD28N_{mm}, and MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}N_{##} to the PDR Server for archive and distribution at the GSFC DAAC.

Production Rules

PGE74 runs after all of the L3 Oceans Monthly (PGE73) processing has been completed for the year. The operational scenario is nominally 40 activations every year, representing the processing of one of the L3 Ocean Color yearly parameter products or one of the L3 Ocean SST yearly parameters in either the day or night mode per PGE execution. The Period Specification Production Rule is required for PGE74.

Nominally one year of one of the following L3 Oceans daily input products are required: MODOCM₀₁-MODOCM₃₆, MOD28M_{D1}, MOD28M_{D2}, MOD28M_{N1}, or MOD28M_{N2}. The Data Days covered in the input and output yearly products need to be specified using the Data Day Production Rule, which is a special implementation of the Runtime Parameter. For this Production Rule, MODAPS stages the input granules of the parameter being processed according to their Data Day to match the Oceans Yearly output and passes the start dataday and end dataday to the PGE as Runtime Parameters. A Minimum Number of Granules for the required daily input products is specified and a time-out is associated for running PGE74 if the minimum requirements are met.

PGE74 also produces map images for each of the 40 ocean parameters. The map for each ocean parameter includes eight types of values and three resolutions or sizes. The L2 Flag Byte 3 is only produced for parameters 13 through 25.

The Production Rules for PGE74 are:

- Period Specification,
- Data Day,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files**Static Input ESDT**

MODOCTB	MODIS/Terra Ocean Time Binner Parameters
MODOCSPC	MODIS/Terra Ocean Space Converter Parameters
MODOCMAP	MODIS/Terra Oceans Mapper Parameters

Dynamic Product Input ESDT

One of the following for each PGE profile activation:

MODOCM _{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Monthly L3 Global 4km ISEAG (where nn = parameters 1 through 36) (R) 1*
MOD28M _{mm}	MODIS/Terra Sea Surface Temperature QC'd Params 1-2 Monthly L3 Global 4km ISEAG (where mm = parameters D1, D2, N1, N2) (R) 1*

Dynamic Product Output ESDT

One of the following for each PGE profile activation:

MODOCN _{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Yearly L3 Global 4km ISEAG (where nn = parameters 1 through 36) (A _M) (A _D) 1*
MOD28N _{mm}	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 Yearly L3 Global 4km ISEAG (where mm = parameters D1, D2, D3, D4) (A _M) (A _D) 1*

Map Images

MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}N##

MODIS/Terra Ocean Color and SST {Mean} Maps Yearly L3 Global 4km} CylEqDis

{Std. Dev.}{36km}

{Number}{1Deg}

{Quality}

{Common Flags}

{Flag Byte 1}

{Flag Byte 2}

{Flag Byte 3}

(Where:

M = MODIS

O = Oceans

{04, 36, 1D} = resolution and size:

04 = 4 km

36 = 36 km

1D = 1 Degree

{M, S, N, Q, F, 1, 2, 3} = values mapped:

M = Mean

S = Standard deviation

N = Number of observations

Q = Quality

F = Common flags

1 = L2 Flag Byte 1

2 = L2 Flag Byte 2

3 = L2 Flag Byte 3 (only produced for ## = 13 through 25)

N = Yearly

= 1 through 36 for Ocean Color parameters or D1, D2, N1,

and N2 for SST parameters.) (A_M) (A_D) 1*

Temporary Product Output

MODOCF_{nn} MODIS/Terra Ocean Color Temporary Composite Params 1-36 Yearly L3 Global 4km ISEAG (where nn = parameters 1 through 36; Interim file used for temporary storage of yearly product in PGE50) (T_M) 26*

MOD28F_{mm} MODIS/Terra Sea Surface Temperature Temporary Params 1-4 Yearly L3 Global 4km ISEAG (where mm = parameters D1, D2, N1, N2; Interim file used for temporary storage of yearly product in PGE50) (T_M) 26*

*per parameter

Dynamic Runtime Parameter for Operations

start dataday	<Start Day for Data Observations (yyyyddd)>
end dataday	<End Day for Data Observations (yyyyddd)>
band to map	<Parameter to process>
SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	"0"
time flag	"N"
gsfc quality	"1"
longitude, origin	"0.0"
latitude, origin	"0.0"
projection rotation	"0.0"
longitude, center	"0.0"
latitude center	"0.0"
output image width in degrees	"0.0"
output image height in degrees	"180.0"
which quality field	"D"
PGEVersion	<Version of PGE74 that appears in the ciList delivered with the code>

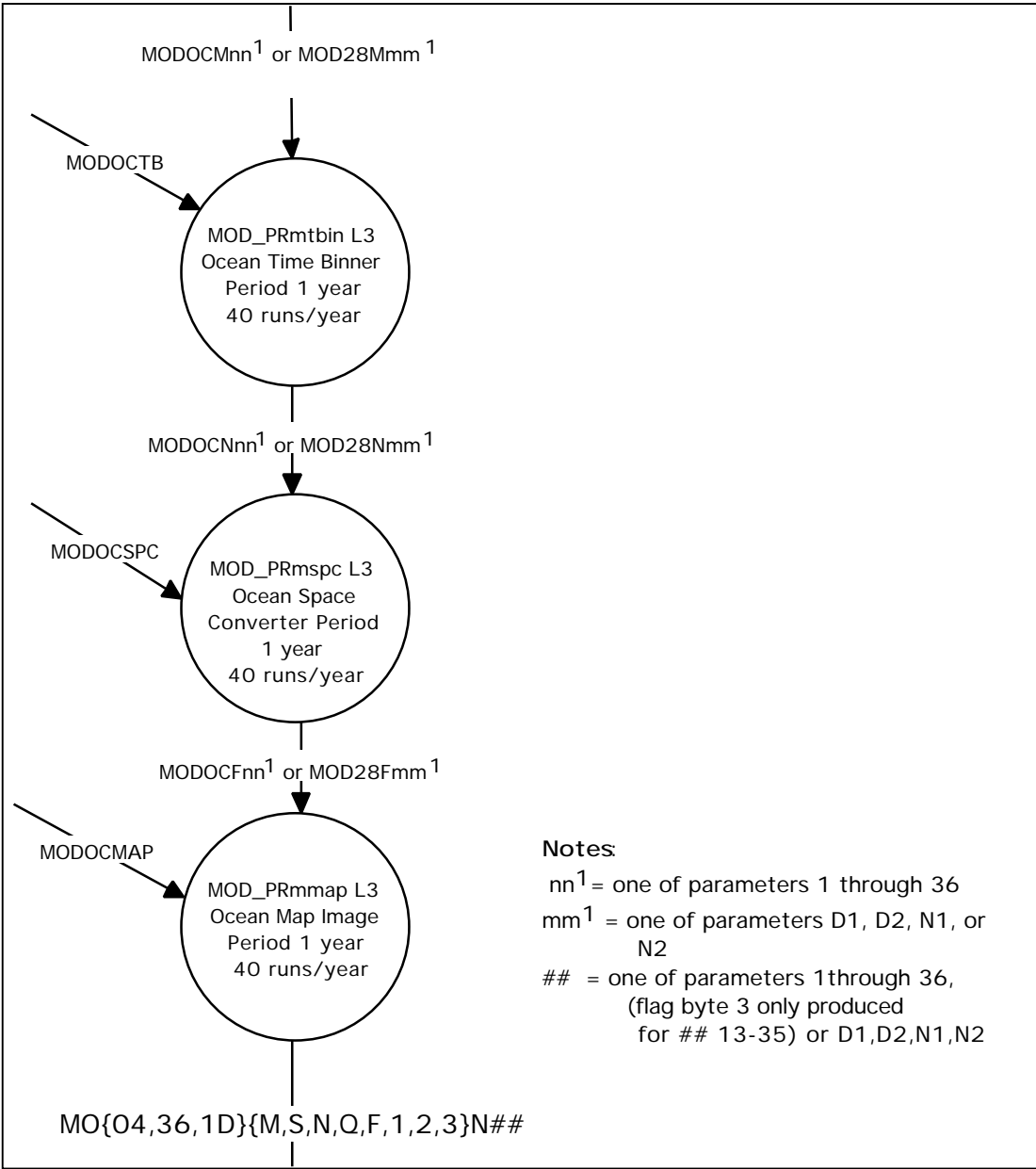


Figure 4-14 PGE74 Structure

4.75. Land Snow and Sea Ice Albedo, Reserved for Future (PGE75)

4.76. Level 1 Daily Ephemeris Predictor (PGE76)

PGE76 performs the ephemeris prediction for MODIS Oceans processing .

Purpose

Using one 2-hour Terra or daily Aqua ephemeris file, PGE76 produces a set of daily predicted ephemeris files on both sides of the input file for use in MODIS Oceans processing.

Structure

PGE76 consists of the ephemeris predictor process (MOD_PRpred) and the ECS orbsim utility.

MODAPS V1 Production

PGE76 is run by MODAPS V1 L1Bsim Loader once a day after ingesting the Terra or Aqua ephemeris file from the GSFC DAAC to produce a daily ephemeris file for the current input day and three predicted daily ephemeris files on each side of the current input day. The 2-hour Terra ephemeris file starting at noon is preferred as the input to PGE76 for Terra processing; but any 2-hour file for the current day may be used. The following day, the new set of current and predicted ephemeris files are overwritten. MODAPS archives the seven predicted files for use in the Oceans PGE09 and PGE10.

MODAPS V2 Production

PGE76 is run by MODAPS V2 Eph Recipe once a day after ingesting the Terra ephemeris file (AM1EPHN0) or Aqua ephemeris file (PM1EPHNF) from the GSFC DAAC to produce a daily ephemeris file for the current input day and predicted daily ephemeris files for three subsequent days after the current day. The 2-hour Terra ephemeris file starting at noon is preferred as the input to PGE76 for Terra processing; but any 2-hour file for the current day may be used. The Terra products for the current day are AM1EPHH for the current day and AM1EPHH1, AM1EPHH2, and AM1EPHH3 for the subsequent days. The Aqua products for the current day are PM1EPHH for the current day and PM1EPHH1, PM1EPHH2, and PM1EPHH3 for the subsequent days. MODAPS archives the four predicted files each day for use in the Oceans PGE09 and PGE10.

The following day, the new set of current and predicted ephemeris files are written, but the previous files are retained. For each day of processing PGE09 and PGE10, MODAPS V2 stages the current day of AM1EPHH or PM1EPHH, the three previous

days of AM1EPHH or PM1EPHH, and the three predicted AM1EPH{H1,H2,H3} or PM1EPH{H1,H2,H3}.

Production Rules

PGE76 runs after the 12 Noon 2-HourTerra or Daily Aqua ephemeris file is ingested by MODAPS from the GSFC DAAC. The operational scenario is nominally one activation per day for each of the two spacecraft ephemeris files. If the 12 Noon Terra ephemeris file is unavailable, any other file for the current day is used. The script for PGE76 runs the MOD_PRpred process and the ECS orbsim utility to produce the predicted ephemeris files. One execution of PGE76 always produces an ephemeris file to match the current day. The differences in the output predicted ephemeris files are explained in the above MODAPS V1 Production and MODAPS V2 Production.

The Production Rules for PGE76 are the following:

Basic Temporal

Advanced Temporal

Runtime Parameters

Data Files

Dynamic Product Input ESDT

AM1EPHN0	MODIS/Terra Spacecraft Ephemeris Native Format (R)1
----------	---

Or

PM1EPHND	MODIS/Aqua Spacecraft Ephemeris Native Format(R)1
----------	---

Dynamic Product Output ESDT

AM1EPHH	MODIS/Terra Current Day Predicted Ephemeris Daily (A_M)	1
---------	---	---

AM1EPHH1	MODIS/Terra Predicted Ephemeris 1 Daily (A_M)	1
----------	---	---

AM1EPHH2	MODIS/Terra Predicted Ephemeris 2 Daily (A_M)	1
----------	---	---

AM1EPHH3	MODIS/Terra Predicted Ephemeris 3 Daily (A_M)	1
----------	---	---

Or

PM1EPHH	MODIS/Aqua Current Day Predicted Ephemeris Daily (A_M)	1
---------	--	---

PM1EPHH1	MODIS/Aqua	Predicted Ephemeris 1 Daily (A_M)	1
PM1EPHH2	MODIS/Aqua	Predicted Ephemeris 2 Daily (A_M)	1
PM1EPHH3	MODIS/Aqua	Predicted Ephemeris 3 Daily (A_M)	1

Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Space craft platform for MODIS Instrumentsupplied by MODAPS. Value = {AM1M,PM1M}>
---------------------	--

5 PRODUCTION RULES

Production rules are a set of formal instructions which direct a data processing system in executing the production software. The Production Rules are provided by ECS for Release B.0 and defined in Appendix C. These ECS Production Rules are used by the MODIS Level 1 PGEs at the GSFC DAAC. MODAPS runs the higher level PGEs using these basic production rules. However, the implementation at MODAPS is different. In addition to the basic production rules, MODAPS implements many customized production rules specific to a PGE and many combinations of the basic production rules that are not implemented in the ECS.

The ECS Production Rules can be considered as basic building blocks to be used to construct a data processing scenario for a PGE. It is unlikely that such a data processing scenario built before the PGE is actually run in the ECS PDPS will be the final one that is used in production during the mission. The Production Rules and values assigned to parameters for the PDPS will be fine-tuned at SSI&T and even after the mission begins. Thus the high-level description of the Production Rules for each PGE and the detailed descriptions of Production Rules delivered with the PGE may be considered as initial guesses for an optimization process which builds the PGE's data processing scenario.

5.1 Top-Level Construction of Data Processing Scenario

The construction of the processing scenario begins with a determination of the top-level Production Rule to be used for the PGE. A selection is made from the following ECS Production Rules:

- Basic Temporal
- Period (Calendar) Specification
- Period Start_of_N_Days Specification
- Orbit-Based
- Latitude/Longitude Tiling
- Zonal Tiling

The Basic Temporal activation is based on the start and end data dates and times for the output data. Examples of production software using Basic Temporal are L1 and L2 PGEs. The two types of period specification allow for processing on a calendar period or on a selected cycle of a set number of days (i.e., 8, 16, or 32 days). Examples of production software using period specifications are L3 and L4 PGEs.

For the Orbit-Based Production Rule, ECS maintains orbit numbers and corresponding temporal ranges in an internal table. Orbit numbers are specified on production requests.

Information for the Tiling Production Rules must be provided to ECS PDPS in separate tile description files. The current Latitude/Longitude Tile specification file requires Tile ID numbers, the bounding latitude/longitude coordinates for each tile, and a tile description. Zonal Tiling may be available in a later ECS software delivery. The Zonal Tiling will be implemented by specifying the latitude coordinates which bound the zonal tile. The Tiling Production Rules will also have an associated, secondary Production Rule of Period Specification or Period_Start_of_N_Days Specification.

The ECS PDPS uses two basic strategies for determining when to activate a PGE for a specific DPR. These strategies are incorporated into Production Rules based solely on time and based on a tiling scheme which is to be invoked periodically.

For PGEs which have a top-level Production Rules based on time, the activation is data driven by the availability of the required input granules. Some PGEs in this category are scheduled to run periodically (i.e., daily, once every 8-days, or once every orbit). Others are scheduled to run according to a specific temporal period (i.e., every 2 hours or every 5 minutes). The Planning and Scheduling System breaks up the PGE processing request on a regular schedule into DPRs on nominal time boundaries (i.e., the beginning of the day at 00Z hours to the end of the day or every 5 minutes of the day beginning with hour 00Z). The PDPS keeps track of the data granules required by the PGE for the processing period of the DPR as the granules arrive on the Data Server. Using a correlation algorithm, the PDPS determines the best match of the start and stop times of each arriving on the Data Server with the start and stop times of the scheduled DPRs over the length of time for which the data processing was planned. Once all of the required granules have arrived, the clock is set and timers may begin for other types of input. This sequence of events may be altered by setting a minimum number of granules for the required inputs with an associated time as described below. The PGE is executed when all required granules are available unless there are other requirements which are not yet met.

For PGEs which have a top-level Production Rule based on tiling, the PGE activation is based upon a combination of the actual time of the data within the granules in the processing period and the time required for the Data Processing center to generate all of the input products for the PGE. The input product generation time is pre-determined and a query delay time is set accordingly. Thus, the query delay time is fixed at the time the PGE is requested during SSI&T at the DAAC. At the end of the query delay

time for a DPR, the data server is queried for input granules meeting the tiling requirements and is activated if any of the required granules are available. The DPR is deleted if the requirements are not met. DPRs which require only tiled products as input require no query delays.

The ESDT data sets associated with the PGE are categorized at the top level as Input Products and Output Products. The top-level production rule selected above describes both input and output. Output Products are in general produced for the basic processing period associated with this top-level production rule. Some, but not all, Input Products are acquired for the same basic processing period. Using the Advanced Temporal Rule, delta times for input ESDTs may be specified before and after the processing period. The Advanced Temporal Rule is discussed in Section 5.8. Other Production Rules are primarily associated with the input products.

5.2 Additions of Other Production Rules for the Data Processing Scenario

Data processing for actual PGEs requires some perturbations on the top-level Production Rule. Other Production Rules from Appendix C may be added to the production scenario for the PGEs. The Input Products are further classified as the following types:

- Required - Mandatory input/no alternatives
- Optional - Not required input/PGE will run without it
- Alternate - One, and only one, alternative data set can be used in the PGE run. One alternate must be available for the PGE to run. The first choice is labeled as the Primary and has an order of 1. Other choices are labeled as Alternate and have orders of 2, ..., n.

The Required Input Products have an associated timer so that timers for the other types of inputs can be set. This top-level timer is set when the first required granule arrives on the Data Server. All other timers are relative to this basic timer.

5.3 Optional Inputs and Alternate Inputs

If the PGE has optional inputs, the Optional Input Production Rule is selected in addition to the top-level rule for the Data Processing Scenario. The PGE is expected to be able to run with or without the optional inputs. If the PGE has alternate inputs, the Alternate Input Production Rule is also selected. The Production Rule for Alternate Inputs selects the order for the choices of data sets and associates a timer with each choice.

The time-outs for the Optional and Alternate Inputs depend on the times for the Required Inputs. The Optional and Alternate Input Production Rules operate according to the following algorithms:

- Timer for Optional Inputs begins only after all the required inputs are known to be available. Time-outs for multiple optional inputs are concurrently counted down.
- Timer for the Alternate Inputs begins only after all the required inputs are known to be available. Time-outs for alternate inputs run consecutively.

5.4 *Minimum Number of Granules and Associated Time-outs*

In reality, not all of the granules of any input may be available, even after a reasonable waiting period. The Science Team may want to run the PGE anyway with only part of the granules. For this case, the Minimum Number of Granules Production Rule is selected for the scenario.

The use of minimum number of granules for a PGE requiring a top-level Production Rule based solely on time produces different results from a PGE requiring a top-level Production Rule based on tiling. Minimum numbers of granules are generally set for Required inputs and Alternate inputs to a PGE with the time based activation and no tiling Production Rule. The following results are obtained for each of these types:

- Required Inputs: If a minimum number of granules is set along with a timer for the Required Inputs, the PGE will be scheduled to run at the end of the time-out if at least the minimum number are available. To give the required inputs a reasonable chance to arrive, the PGE will not be run before the time-out unless all are available. It is up to the Science Teams to keep the timers for multiple required inputs in sync.
- Optional Inputs: The capability of setting a minimum number of input granules for Optional Inputs was not implemented since it is not really applicable. A timer set for Optional Inputs begins when all of the Required Inputs are available.
- Alternate Inputs: If a minimum number of input granules is set with a timer for each Alternate Input, the timer for next choice starts if the minimum number of inputs is not available for the current choice. If the higher priority alternate becomes available (due to arrival of at least the minimum number of input granules) during the wait period for the lower priority alternate, the PGE will be activated with the higher priority alternate input. The final choice should be a long-term or static file that is always available.

For a PGE with activation based on the Latitude/Longitude Tiling Production Rule, setting a minimum number of granules for input ESDTs would cause the DPR to be

deleted at the time of query if the minimum number were not available. This is not a desirable result if the objective of setting a minimum number was to delay the processing until a sufficient number of granules is available. In addition, there are many processing periods in which only one input granule is expected in a tile. Thus, the minimum number of granules for the tiling PGE must be set to one.

5.5 Metadata-Based Activation and Metadata-Based Query

The ECS PDPS provides the capabilities of conditional activation of PGEs and selection of granules of particular ESDTs for staging based upon a metadata query on Inventory Attributes and PSAs. The Metadata-Based Activation Production Rule determines whether the PGE is executed or not. During the registration of the PGE at the DAAC, this Production Rule is specified by entering parameters in a PGE Object Definition Language (ODL) file under the object of Metadata_Checks. The Metadata-Based Query Production Rule controls which granules of a particular ESDT are staged for the PGE run. In the PGE registration, this Production Rule is specified by entering parameters under the object of Metadata_Query.

The required parameters for both of these rules are the name of the Inventory Attribute or PSA in one or more ESDTs, an operator for the query or checking, and a value for the check or comparison. Both of these metadata-based rules have an optional parameter named Database_Query which will cause the query to be performed on a value retrieved from the PDPS Database rather than the value for the Inventory Attribute or PSA. The default is to use the Inventory Attribute or PSA.

Checks and queries may be specified for more than one ESDT input to the PGE and on more than one Inventory Attribute and PSA. Multiple metadata checks and queries are implemented as a logical "AND" capability. There is currently no logical "OR" capability.

5.6 Runtime Parameters

Runtime parameters must be specified along with a logical unit number (LUN) in the PCF for the PGE. Many runtime parameters are used to direct the PGE to perform in multiple ways, such as to produce a different set of products. These runtime parameters are usually static; they are not intended to be changed when the PGE is executed. The information from the PCF is automatically put into the PDPS Database by SSI&T software when the PGE is registered at the DAAC. However, the PDPS allows overrides of the runtime parameters to occur when the production requests are entered. Information for a dynamic insert of values for runtime parameters for DPRs must be supplied to the PDPS at the registration of the PGE. Specification of the Runtime

Parameter Production Rule will accomplish the override defaults for the runtime parameters in the PCF. To set a dynamic value for the PGE parameter at runtime, a key-word value is selected from a set of available valids. Typical key-words that may be used for MODIS PGEs are "TILE ID" and "ORBIT NUMBER." If these dynamic runtime parameters are specified at the PGE registration, the PDPS will insert the actual runtime values into the runtime parameter entries in the instantiated PCF for the PGE being executed. These runtime parameter values may be read by the PGE and used in generating its products.

Values for several dynamic runtime parameters are supplied by MODAPS and ECS to the PGEs at the time they are executed. The actual names of the dynamic runtime parameters may vary between MODAPS and ECS, but the meanings are the same. PGE scripts, designed to perform various functions at runtime, are responsible for reading the values supplied by the production system and inserting the values into the appropriate runtime parameter associated with a logical unit number in the PCF. The dynamic runtime parameters input by the production system and available for all PGEs are the collection start date and time, the collection end date and time, and the satellite on which the instrument is mounted.

- . Start Collection Date Time – Start date and time for the data observations
- . End Collection Date Time – End date and time for the data observations
- . SatelliteInstrument – Spacecraft platform for the MODIS Instrument supplied by the data processing system. Value = AM1M for Terra and PM1M for Aqua.

5.6.1 MODIS Land Tiling Runtime Parameter

The MODIS Land PGEs that require the Latitude/Longitude Tiling Production Rule will make use of dynamic runtime Parameters known to the PDPS Database as "TILE ID." The PGEs using the Tiling Production Rule execute once per tile. The tiles are defined by latitude and longitude coordinates and a Tile ID number in a Tile Definition File. In order to make use of this runtime parameter, the PCF for each of these PGEs must contain a runtime parameter, "TILE ID," with an associated logical unit number. This runtime parameter will be specified at the PGE registration with an associated key-word "TILE ID" in the PGE Parameter Dynamic Value in the PDPS Database. With each execution of the PGE, the PDPS returns the value of "TILE ID" as a runtime parameter in the instantiated PCF. The MODIS Latitude/Longitude Tiling Production Rule is discussed in more detail in Section 5.7.

5.6.2 MODIS Ocean Data Day Runtime Parameters

The MODIS Ocean PGEs which require the Data Day Production Rule will make use of the dynamic Runtime Parameters known to the PDPS Database as “start dataday” and “end dataday.” The PDPS incorporates an algorithm provided by the MODIS Oceans Group for determining each Ocean Data Day, and tracks the Data Days for production. Delta offset times on both sides of the processing period are specified using the Advanced Temporal Production Rule when the PGEs are registered. For each run of these Ocean PGEs, PDPS stages the correct amount of data on either side of the GMT day for both day and night mode executions, using the “start dataday” and “end dataday” as limits for a Metadata Query on the Data Day PSA in the Ocean L3 products. Both daily and multiple day Ocean PGEs require the Data Day Production rule. At runtime, PDPS returns the values of the “start dataday” and “end dataday” in the runtime parameters defined with associated logical unit numbers in the instantiated PCF. For daily PGEs, the start and end datadays will be equivalent.

5.7 Latitude/Longitude Tiling

The MODIS Land Science Software requires tiling production rules starting with the processing of the L2G products. For a PGE to use the ECS Latitude/Longitude Tiling Production Rule, a tile scheme must be defined for use by the ECS PDPS. The tiling scheme is defined in a Tile Definition ODL File. The boundaries for each of the MODIS tiles in the scheme are defined as four latitude and longitude coordinates. Many different tiling schemes are allowed in the system, but each has a separate definition file.

5.7.1 Tile Definition File

The parameters in the Tile Definition File are the following:

- **TILE_SCHEME_NAME** - A string of maximum length of 20 characters, which uniquely identifies the tiling scheme. This name must be identical to a fixed positional character string in the Tile Definition ODL file name.
- **TILE_ID** - A 32 bit integer with a unique value greater than 0 and less than the maximum for a 32 bit integer. A **TILE_ID** value is listed for each tile in the scheme. Values should be listed monotonically; they do not need to be consecutive integers. MODIS plans to use an eight digit integer with the following encoded fields:
 - Digit 1 - Projection (Valid: 1 = Integerized Sinusoidal, 2 = Goode’s Homolosine, 3 = Lambert Azimuthal Equal-Area with projection center at the North Pole, 4 = Lambert Azimuthal Equal-Area with projection center at the South Pole).

- Digit 2 - Tile Size (Valid: 1 = full size tile, 2 = quarter size tile, 4 = one-sixteen size tile).
- Digits 3-5 - Horizontal Tile Cell Number in the matrix.
- Digits 6-8 - Vertical Tile Cell Number in the matrix.
- **TILE_DESCRIPTION** - A string of maximum length of 255 characters, which describes the contents or format of the tile scheme. MODIS plans to use Row and Column in the tile cluster matrix, followed by a brief description of the geographical area covered. The MODIS Land format for the matrix is hnnnvmmm, where h stands for horizontal, nnn is the horizontal position, v stands for vertical, and mmm is the vertical position.
- **LATITUDE** - A floating point number representing the latitude coordinate of a point defining the tile boundary (Valid Range: -90.0 to +90.0).
- **LONGITUDE** - A floating point number representing the longitude coordinate of a point defining the tile boundary (Valid Range: -180.0 to +180.0).

Each tile must have at least four tile coordinates. The coordinate objects for each tile in the Tile Definition File must be specified in clockwise order. Each **TILE_COORDINATE** object has an associated **LATITUDE** and **LONGITUDE** as well as a counter called **CLASS**. MODIS will have four coordinates to define a tile.

5.7.2 Latitude/Longitude Tiling Production Rules for PGEs

Every PGE which requires a latitude/longitude tiling production rule must have an associated tile scheme. A PGE may be run in multiple ways using different inputs to produce different products. Thus the same PGE may be associated with different PGE profiles. Each PGE profile may have a different associated tile scheme. There is only one tile scheme allowed per PGE profile.

5.7.3 MODIS Land Tiling Scenarios

MODIS Land data processing includes several latitude/longitude tiling scenarios. The Production Rules for the two basic L2G type PGEs are described in Scenario 1, as part a and b. The Production Rules for the L3 and L4 type PGEs are described in Scenarios 2 and 3.

5.7.3.1 Scenario 1a:L2G Pointer

The input data to L2G Pointers (PGE12) are 5 minute L1 granules of Geolocation data in swath format. The objective of the Tiling Production Rule is to perform daily processing for the L2G PGE for all the tiles defined in a specified tile scheme. PDPS will schedule one DPR for each tile in the scheme. When the DPR is activated, the PDPS

will identify and stage all of the input L1 Geolocation granules with data in the tile specified in the DPR. The PDPS performs a query on the Data Server for Geolocation granules with latitude/longitude coordinates that overlap the Latitude/Longitude coordinates which define the tile being processed. The tile boundaries are obtained from the pre-defined tile scheme. The Data Server will acquire all of the identified Geolocation input granules. PDPS will then pass the TILE_ID back to the PGE as a runtime parameter in the PCF and execute the PGE. The PGE code should read the TILE_ID and store the tile identification in pre-defined PSAs in the output products. PDPS runs all of the tiles in the scheme each day and keeps track of which ones were created. The L2G Pointers daily processing for Tile 1 can be represented by Figure 5-1.

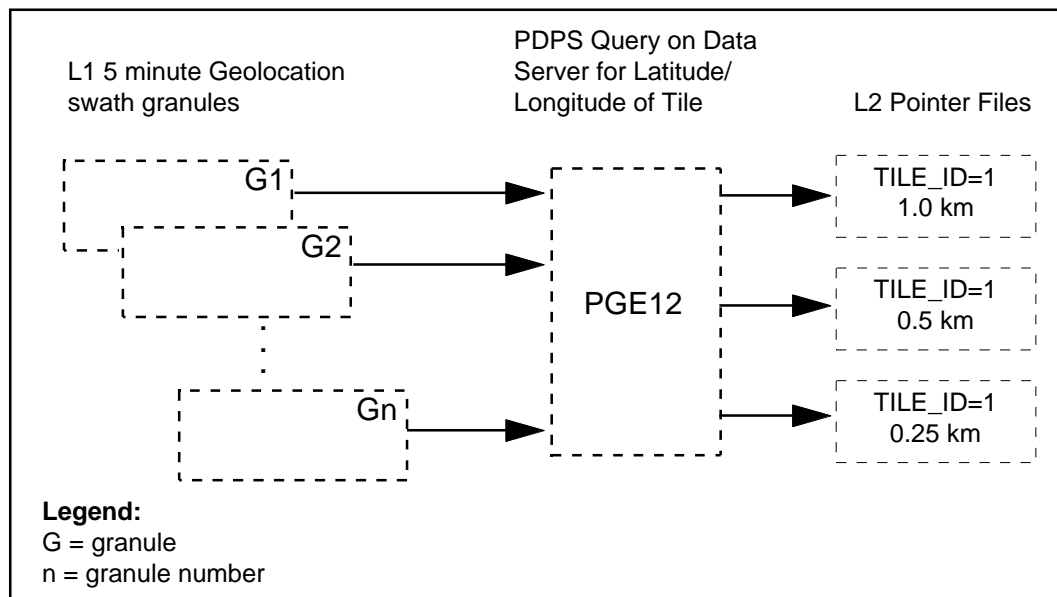


Figure 5-1. Tiling Production Rule for L2G Pointers

At the PGE registration the PDPS requires information relating to the PGE itself and all of the input and output files. The information required for the Tiling Production Rule, as modified in January of 1998, requires specification of three parameters: SCHEDULE_TYPE which is set to "Tile"; TILE_SCHEME_NAME which is named by MODIS Land Group; and a new parameter, QUERY_DELAY. Under the ECS Production Rules the timing for the activation of the DPR for a PGE requiring the Latitude/Longitude Tiling Production Rule must now be computed based on the actual date and time of the data within the granule and the time it will take the ECS PDPS to process all of the inputs required for the PGE. The QUERY_DELAY parameter must be set to indicate when the PDPS should start the query to the Data Server for input L1

Geolocation granules based on the date and time of the data for the day to be processed. For example:

To run the daily L2G Pointers PGE for the data on January 1, PDPS in the absence of a QUERY_DELAY would start a query to the Data Server for input granules on January 2, which is the end of the processing period. In this scenario all of the L1 Geolocation granules may not have yet been processed and inserted on the Data Server. A QUERY_DELAY needs to be set to allow a reasonable time for PDPS to perform the processing of all input granules. For processing L2G Pointers for January 1, the start day for the query and the QUERY_DELAY should be computed as follows:

(Start counting at January 2, the DPR stop time) + (two days delay for EDOS products) + (one day to produce L1A products) = January 5

QUERY_DELAY = 2 days for EDOS + 1 day for L1A = 3 days

Each input data set must also specify parameter QUERY_TYPE as "Tile," which indicates that the data retrieval is performed by spatial location of the tile.

The date and time of the science data within the processing period and the QUERY_DELAY parameter are the primary factors in determining when the DPR will be activated. Although for some tiling schemes a minimum number of granules could be specified for each input ESDT, there are many tiles for which only one input granule can reasonably be expected. In addition, setting a minimum of more than one may cause the DPR to be deleted at the query time before an investigation could be made to determine why the expected input was not available. Thus, the best strategy for the Tiling PGEs is to fix the minimum number of granules at one and optimize the time for the PGEs to execute by varying the QUERY_DELAY. The value of one will be specified for tiling PGEs in all of the tiling scenarios.

5.7.3.2 Scenario 1b: L2G Land Products

The input data to L2G Land products (PGE13, PGE14, and PGE15) are 5 minute L2 granules of surface reflectance/thermal anomalies, snow, or sea ice, respectively. In addition, the L2G pointers are inputs to these PGEs. The objective of the Tiling Production Rule is to perform daily processing for the L2G Land products for all the tiles defined in a specified tile scheme. PDPS will schedule one DPR for each tile in the scheme. When the DPR is activated, the PDPS will stage all of the input L2 data granules with data in the tile and all of the L2G pointers for that tile that are required for the PGE. For a defined tile scheme, surface reflectance (PGE13) is run once with each set of pointers at the three resolutions and once for thermal anomalies. Snow (PGE14)

uses only the 0.5 km pointers and sea ice (PGE15) uses only the 1 km pointers. PDPS uses the same process to acquire the L2 granules, a query to the Data Server. However, the L2G pointers files are already tiled. Thus PDPS can query its own PDPS Database for the TILE ID for the L2G Pointers granules. PDPS will then stage the L2G Land products and pointers files that correspond to the TILE ID in the Tile Definition File, pass the TILE ID back to the PGE as a runtime parameter in the PCF, and execute the PGE. The PGE code should read the TILE ID and store the tile identification in pre-defined PSAs in the output products. The L2G Land products daily processing for Tile 1 can be represented by Figure 5-2.

The values for SCHEDULE_TYPE and TILE_SCHEME_NAME are the same as for Scenario 1a. The QUERY_DELAY must be computed based on a different set of input products. The QUERY_TYPE for the input L2 Land products is set to "Tile," but the QUERY_TYPE for the input L2G pointer is set to "Already Created Tile".

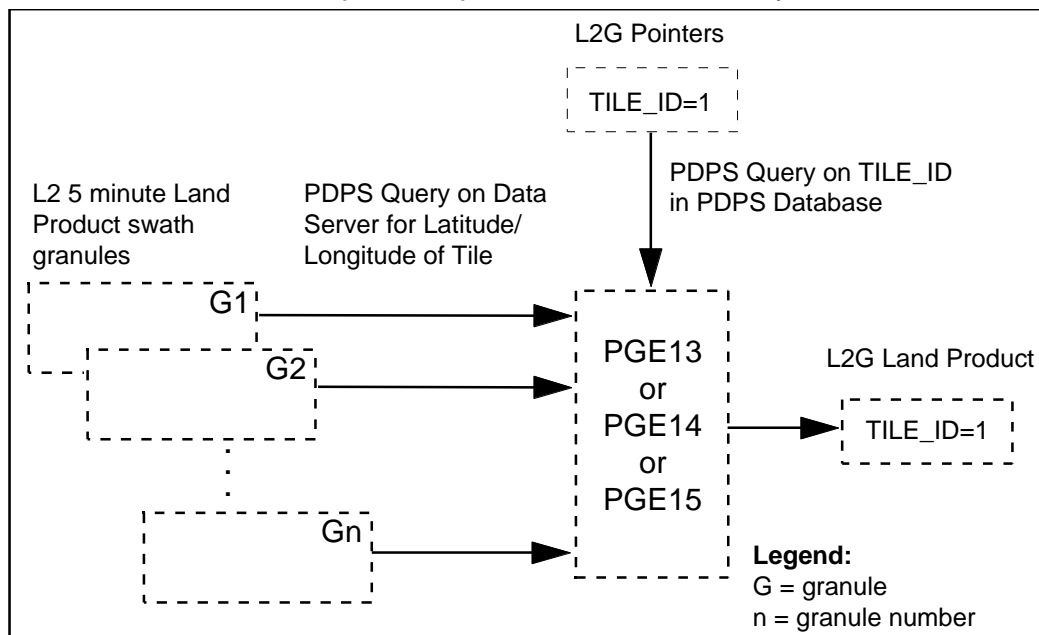


Figure 5-2. Tiling Production Rule for L2G Land Products

5.7.3.3 Scenario 2: L3 and L4 Land Tiled Products

The L3 Land PGEs are run on a tile by tile basis for all of the tiles in a defined tile scheme.

The input data to the first L3 Land products in the processing chain are the daily L2G tiled granules of surface reflectance, snow, or sea ice from one of the L2G Land PGEs and for some of these L3 PGEs the L2G Pointers. For subsequent L3 PGEs only the L3 tiled products are input. The outputs from the L3 Land PGEs are daily, 8-day, 16-day or

32-day L3 tiled granules of surface reflectance, snow, sea ice, or other derived Land product. L4 products are derived from a model, but the PGEs follow the same rules as the L3 PGEs. For a daily L3 PGE the processing for one execution of the PGE will consist of an input of one tiled L2G Land product granule to produce an output of one tiled L3 Land product granule for the same TILE_ID. Some of these PGEs also input the corresponding L2G Pointers. For the N-day L3 or L4 PGE, the processing for one execution of the PGE will consist of an input of N days of tiled L2G Land product granules, including pointers for some PGEs, or L3 Land product granules with the same TILE_ID to produce an output of one tiled L3 or L4 Land product granule with the same TILE_ID. If the processing of the input tiled granules was done at the same location at which the current PGE is to be run, the PDPS can query its own PDPS Database for the TILE_ID to stage the input tiled granules required to process that tile in the tile scheme. The processing of L3 and L4 Land products can be represented for these cases by Figure 5-3.

For this scenarios the QUERY_DELAY is not needed because all of the inputs already have TILE_IDs. The SCHEDULE_TYPE and TILE_SCHEME_NAME have the same values as Scenarios 1a and 1b. The QUERY_TYPE is set to "Already Created Tile".

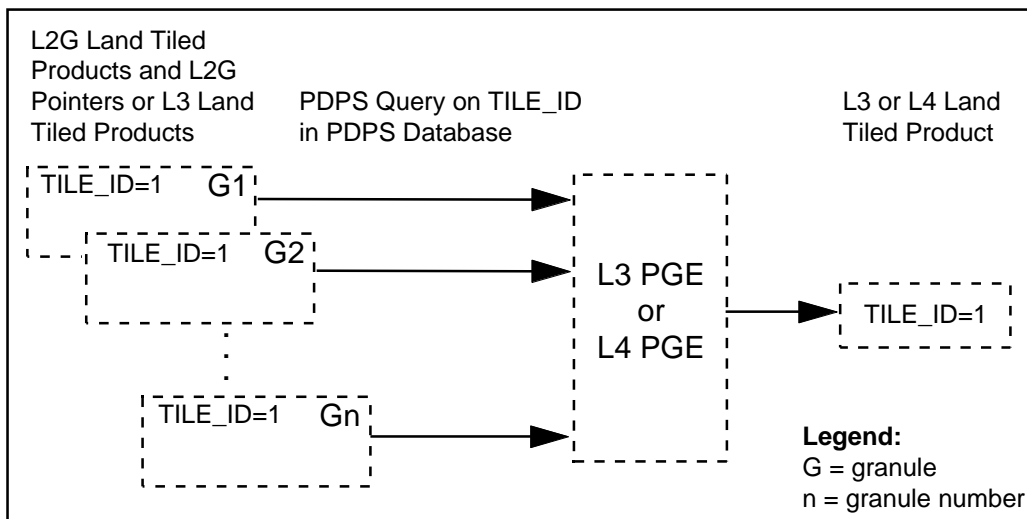


Figure 5-3. Tiling Production Rule for L3 and L4 Land Products

5.7.3.4 Scenario 3: L3 and L4 Land Tiled Products Generated at a Different Processing Center

When the tiled input products to a L3 or L4 Land PGE are created at a different processing center than the one at which the PGE is being executed, the PDPS has no previous PDPS Database to query on the TILE_ID for staging the input tiled granules. Thus the tiling production rules for the first L3 or L4 PGEs in the chain at the

downstream processing center are different from tiling production rules for subsequent PGEs at this center. The production rules for the first PGEs are very similar to Scenario 1a. The PDPS must perform the query for the tiled input granules on the Data Server using latitude/longitude coordinates for each tile. The processing of the first L3 and L4 Land products can be represented for these cases by Figure 5-4.

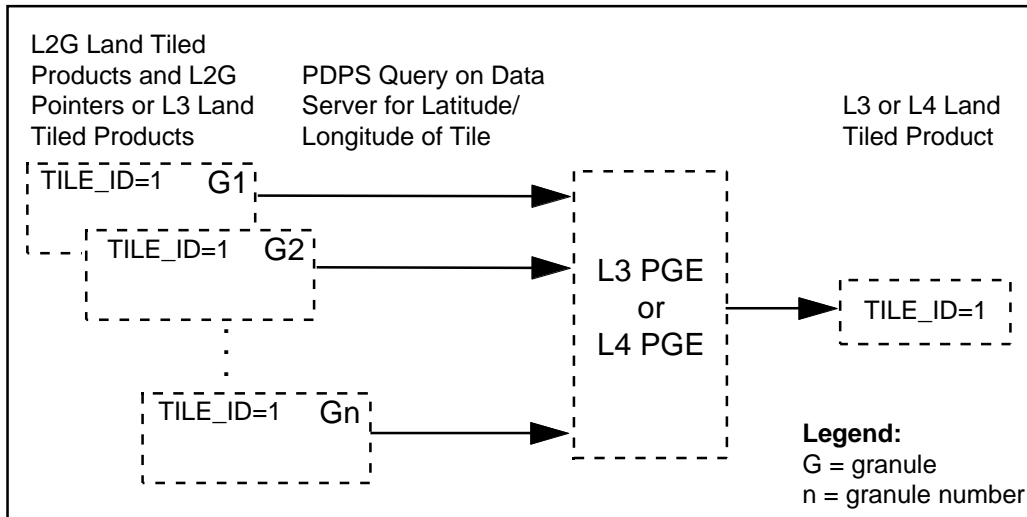


Figure 5-4. Tiling Production Rule for L3 and L4 Land Products at a Different Processing Center

The parameters for the PDPS Database must include the QUERY_DELAY parameter. An estimate of the delay time for this type of PGE should include the sums of processing time for each layer of input products and the transfer of the data from the processing center for the input data to the processing center for the output data.

For each input L2G Pointers (ESDT) and L2G or L3 Land product (ESDT), the ESDT tile related attribute, QUERY_TYPE, must again be set to "Tile" to retrieve by spatial location at the PGE registration. The SCHEDULE_TYPE and TILE_SCHEME_NAME attributes are the same as those listed above for the other scenarios.

For subsequent L3 and L4 PGEs in the processing chain, the PDPS Database can now be used at the downstream DAAC to retrieve all the tiled inputs. Thus no QUERY_DELAY is needed and the QUERY_TYPE for all ESDTs is set to "Already Created Tile".

5.8 Advanced Temporal Production Rule

The input products requested for a PGE may include granules of an ESDT which are outside the processing period for the PGE run. The Advanced Temporal Production Rule is provided for this capability of retrieving input files beyond the processing period.

Using this production rule, delta times are applied to both the start and end of the processing period to acquire input granules of a specified ESDT. Negative deltas move the date/time backward in time and positive deltas move the date/time forward in time. Different deltas may be applied to each input ESDT. Most ESDTs have a RangeDateTime in the granule Inventory Metadata. The PDPS uses a correlation function to determine the best match of the input granule's RangeBeginningTime and RangeEndingTime with the start and end times of the DPRs. The algorithm for setting the deltas for the Advanced Temporal Production Rule assumes that the correlation function is extended to the retrieval of granules outside the processing period. Granules of ESDTs with only a SingleDateTime in the granule Inventory metadata are retrieved for a DPR, including the extended delta range, only if this SingleDateTime falls within the extended DPR window. The granules in the extended time periods may be acquired using either the same logical unit numbers or different logical unit numbers from the granules of the ESDT in the current processing period depending on the specific requirements of the PGE.

The Advanced Temporal Production Rule can be used with EOS Instrument products, such as MODIS products, and with external ancillary data sets. The MODIS products generally have an associated RangeDateTime in their granule level metadata corresponding to the actual valid range of coverage of the data within the file. Granules of these input products on either side of the processing period are retrieved by specifying a delta time that is a simple multiple of the date/time range covered by the input granules. Any input granule whose RangeDateTime overlaps the window between the start and end delta times is retrieved for the PGE run. Any ancillary data sets that have a RangeDateTime in their metadata corresponding exactly to the actual data in the file may be retrieved using the same algorithm.

The general form of the algorithm for retrieving any type of input data set to match the data being processed in the DPR plus additional input data outside the processing range of the DPR is shown below. Although it is not needed for setting the delta times at SSI&T, the algorithm for verifying the new start and end times is also described so that the correctness of the delta times can be verified for the DPR.

$$S_{del} = (n * r) + i - p/2$$

$$E_{del} = (n * r) + i - p/2$$

$$S_{new} = S - S_{del}$$

$$E_{new} = E + E_{del}$$

where:

Sdel = delta time to be set to start of processing period

Edel = delta time to be set to end of processing period

Snew = start time of processing period with delta time

Enew = end time of processing period with delta time

S = start time of processing period

E = end time of processing period

n = number of input files or granules required outside of processing period

r = range of time covered by input file or granule

i = offset time interval representing a difference in the temporal metadata and the actual time range over which the data in the input files are valid

p = nominal range of time covered by a granule of required product input for DPR processing period for which matching ancillary files are retrieved by a single time (generally the same as DPR period)

The “i” offset time interval is an artifact of the ancillary data set itself. There is a difference in the temporal metadata and the time range over which the data are valid.

The “p” time range is an artifact of the finite time interval between the start and end time in the metadata for the granules of Science Instrument data being processed in the DPR.

The use of the Advanced Temporal Production Rule with external ancillary data inputs can be more complicated. Many ancillary data products are provided by models from which snapshots of the data fields are extracted at synoptic times. Other ancillary data products have averaged times appended into files which are generated at definite time intervals, such as daily files. Some of these ancillary data sets contain the RangeDateTime and others contain the SingleDateTime. Different algorithms must be used in setting the delta times for these various types of ancillary data files. All of these can be derived from the general form of the algorithm described above.

The algorithms presented in the SDD are intended as guidelines and defaults for each type of ancillary data. The defaults represent the most common use of the ancillary data sets. The algorithms will stage the input files which contain data that best match the processing period of the PGE and thus the MODIS data being processed in the PGE run. Unless the Instrument team overrides the default usage by specifying other criteria

for retrieving the ancillary data files, the default algorithms will be used to specify the deltas for the Advanced Temporal Production Rule at registration of the PGEs.

The following cases describe the algorithm, for each of the time-varying ancillary data types to be staged for the MODIS Science Data Processing. For each example, it is assumed that the PGE requires the input data files that best match the data in the processing period. The PGE may also require some additional files on either side of the current processing period. The science software development team must specify either the number of additional files or the time interval on each side. The examples selected are those that are most relevant to the MODIS data processing.

5.8.1 Case 1: Input ESDT with Associated RangeDateTime Matching the Actual Valid Range in the File

Case 1 applies to most input MODIS products for which granules outside of the current processing period are required for the PGE run. The REYNSST ancillary data, which is described in Table 3-4, also falls into this category. REYNSST is a weekly data file of SST data for which the “dd” in the file name is the middle of the 7-day period. The RangeStartingTime is at 00 Z hours on the first day and the RangeEndingTime is at 24 Z hours on the last day.

The algorithm which can be used to set the negative delta time on the start and positive delta time on the stop of the DPR is a simplified version of the general algorithm. There is no offset time interval for these types of input data. Thus, “i” is set to 0. The ancillary data are retrieved by a time range. Thus, “p” is set to 0. The following algorithm is used for Case 1:

$$S_{del} = n * r$$

$$E_{del} = n * r$$

$$S_{new} = S - S_{del}$$

$$E_{new} = E + E_{del}$$

where:

S_{del} = delta time to be set to start of processing period

E_{del} = delta time to be set to end of processing period

S_{new} = start time of processing period with delta time

E_{new} = end time of processing period with delta time

S = start time of processing period

E = end time of processing period

n = number of input files or granules required
 r = range of time covered by input file or granule

Example:

MODIS PGE02 is executed once for each 5-minute granule of MOD03 to produce 5 minute granules of MOD021KM, MOD02HKM, and MOD02QKM. PGE 02 also requires as input, three 5-minute granules of MOD01 (previous, current, and following). To retrieve these three granules of MOD01, the following deltas are set for a DPR with a nominal 5-minute processing period on date 04/15/98:

S = 02 hr 10 min 00.00 sec

E = 02 hr 14 min 59.99 sec

Sdel = (1 * 5 min) = 5 min

Edel = + (1 * 5 min) = 5 min

Snew = 02 hr 10 min 00.00 sec - 05 min = 02 hr 05 min 00.00 sec

Enew = 02 hr 14 min 59.99 sec + 05 min = 02 hr 19 min 59.99 sec

The time window from Snew to Enew, which is used for staging files that match the processing period plus one input file on either side show that the MOD01 granules for nominal 5-minute periods starting at 5 minutes, 10 minutes, and 15 minutes are retrieved for the PGE run. These are the only MOD01 granules whose RangeBeginningTime to RangeEndingTime falls within or overlaps the window from Snew to Enew. These three granules fit the requirements for previous, current, and following MOD01 files.

5.8.2 Case 2: Input ESDT with Associated RangeDateTime and Averaged Times Appended in Each Daily File

Case 2 applies to the DAO ancillary data of the type tavg2d described in Table 3-4. The data sets of this type used by MODIS are DFLAXCHM, DFLAXCLD, DFLAXENG, and DFLAXSTR. All of these data sets contain eight averaged times appended in a daily file. The output for each of the eight Z hours is an average of the previous three hours.

To retrieve the input ancillary data which best matches a current processing period for a PGE which processes a 5-minute granule, only the daily input ancillary data file of the type tavg2d for the current day or the following day are required. For a daily PGE, the daily input ancillary file of the type tavg2d for the current date and the following day are required. The algorithm for setting the delta times on the ends of the processing period is similar, but not exactly the same as in Case 1. Another term must be included so that the next ancillary file which matches data for the last three hours of the day will be

staged. This term is the offset interval time “i” in the general formula. It is only needed at the end of the processing period. The value for the above tavg2d file is three hours because the last three hours of data for each day are included in the file for the next day. The following algorithm is used for Case 2:

$$S_{del} = (n * r)$$

$$E_{del} = (n * r) + i$$

$$S_{new} = S - S_{del}$$

$$E_{new} = E + E_{del}$$

where:

S_{del} = delta time to be set to start of processing period

E_{del} = delta time to be set to end of processing period

S_{new} = start time of processing period with delta time

E_{new} = end time of processing period with delta time

S = start time of processing period

E = end time of processing period

n = number of input files or granules required outside the processing period boundary

r = range of time covered by the interval between the start of one input file and the start of the next input file

i = range of time covered by the interval between the end of one input file and the beginning of the next input file

Example 1:

MODIS PGE06 is executed once for each of 5-minute granule of MOD03 and a matching L1B Calibrated Radiances granule. PGE06 also requires matching granules of DFLAXCLD and DFLAXENG ancillary data. To retrieve the ancillary data that best matches the granules of MOD03, the following deltas are set for a DPR with a processing period of date: 10/15/98.

$$S = 21 \text{ hr } 00 \text{ min } 00.00 \text{ sec}$$

$$E = 21 \text{ hr } 04 \text{ min } 59.99 \text{ sec}$$

$$S_{del} = (0 * 24 \text{ hours}) = 00 \text{ hr}$$

$$E_{del} = (0 * 24 \text{ hours}) + 3 \text{ hours} = 03 \text{ hr}$$

$$S_{new} = 15 \text{ day } 21 \text{ hr } 00 \text{ min } 00.00 \text{ sec}$$

$E_{new} = 15 \text{ day } 21 \text{ hr } 04 \text{ min } 59.99 \text{ sec} + 03 \text{ hr} = 16 \text{ day } 00 \text{ hr } 04 \text{ min } 59.99 \text{ sec}$

The extended range from S_{new} to E_{new} shows that DFLAXCLD and DFLAXENG are retrieved for Day 16 because the RangeBeginningTime for the Day 16 ancillary granules falls within the window from S_{new} to E_{new} . The RangeEndingTime for Day 15 at 21Z hours just touches the border of S_{new} . Using the correlation function, PDPS would determine that the Day 16 ancillary granules are the best match for the processing period.

Example 2:

MODIS PGE51 is activated once every 8 days to produce the MOD27W weekly productivity indices from the MODOCW27 weekly ocean color. PGE51 also requires DFLAXENG ancillary data files which match the eight weeks of input MODIS data. The eight ancillary data files matching the 8-days of PGE51 processing period will be staged without setting a delta on the start of the period. However, to retrieve the three hours average of ancillary data for the last of the 8-day period, the next ancillary file is needed. Using the Start and End of the processing period from date 10/01/98 to 10/08/98, the following delta and extended processing period are computed:

$S = 01 \text{ day } 00 \text{ hr } 00 \text{ min } 00.00 \text{ sec}$

$E = 08 \text{ day } 23 \text{ hr } 59 \text{ min } 59.99 \text{ sec}$

$S_{del} = (0 * 24 \text{ hours}) = 00 \text{ hr}$

$S_{new} = 01 \text{ day } 00 \text{ hr } 00 \text{ min } 00.00 \text{ sec}$

$E_{del} = (0 * 24 \text{ hours}) + 3 \text{ hours} = 03 \text{ hr}$

$E_{new} = 08 \text{ day } 23 \text{ hr } 59 \text{ min } 59.99 \text{ sec} + 03 \text{ hr} = 09 \text{ day } 2 \text{ hr } 59 \text{ min } 59.99 \text{ sec}$

The extended range from S_{new} to E_{new} show that Days 1 to 9 of the DFLAXENG are retrieved because the RangeBeginningTime of the Day 9 ancillary file falls within the window from S_{new} to E_{new} as well as the ancillary files matching Days 1 to 8 at the DPR. The RangeDateTime for other days of DFLAXENG does not overlap the window.

5.8.3 Case 3: Input ESDT with Associated RangeDateTime and Synoptic Times Appended in Each Daily File

Case 3 applies to the DAO ancillary data of the type tsyn2d and tsyn3d as described in Table 3-4. The data sets of this type used by MODIS are DFLAXMIS of type tsyn2d and DFLAPMIS of type tsyn3d. Both of these data sets contain consecutive synoptic times appended in daily files. The tsyn2d has eight synoptic times (0Z, 3Z, 6Z, 9Z, 12Z, 15Z, 18Z, and 21Z). The tsyn3d has four synoptic times (0Z, 6Z, 12Z, and 18Z). The

RangeBeginningTime on each day is at 00Z. The RangeEndingTime on each day is 21Z for the tsyn2d and 18Z for the tsyn3d.

For daily PGEs that require the ancillary data of tsyn2d or tsyn3d that best matches the time of the MODIS data in the processing period, the ancillary file for the next day should be staged in addition to the file for the current day because the last synoptic time in the daily file is valid only to half of the time interval between it and the 00Z hour on the next daily file. For DFLAPMIS, the daily ancillary file with ending synoptic time of hour 18Z is valid up to hour 21Z. For DFLAXMIS, the daily ancillary file with ending synoptic time of hour 21Z is valid up to hour 22Z and 30 min.

A simplified version of the general algorithm describes this case. The term for number of files outside the processing period is included. The synoptic times are the midpoints of the range over which the data are valid. Since several of these synoptic times are packed in a daily file for which a RangeDateTime is associated, only the offset interval time "i" needs to be included.

To retrieve the input ancillary data which best matches the processing period of a MODIS PGE and files outside of the processing period, the following algorithm is used for Case 3:

$$S_{del} = (n * r) + i$$

$$E_{del} = (n * r) + i$$

$$S_{new} = S - S_{del}$$

$$E_{new} = E + E_{del}$$

where:

S_{del} = delta time to be set to start of processing period

E_{del} = delta time to be set to end of processing period

S_{new} = start time of processing period with delta time

E_{new} = end time of processing period with delta time

S = start time of processing period

E = end time of processing period

n = number of input files or granules required outside the processing period boundary

r = range of time covered by the interval between the start of one input file and the start of the next input file

i = range of time covered by one half of the interval between the last synoptic time in one input file and the beginning of the next input file

Example 1:

MODIS PGE06 is executed once for each of 5-minute granule of MOD03 and a matching L1B Calibrated Radiances granule. PGE06 also requires matching DFLAPMIS ancillary data. To retrieve the ancillary data that best matches the granule of MOD03, the following deltas are set for a DPR with a processing period of date: 10/15/98.

S = 21 hr 00 min 00.00 sec

E = 21 hr 04 min 59.99 sec

Sdel = (0 * 24 hours) + 3 hr = 03 hr

Edel = (0 * 24 hours) + 3 hr = 03 hr

Snew = 15 day 21 hr 00 min 00.00 sec - 03 hr = 15 day 18 hr 00 min 00.00 sec

Enew = 15 day 21 hr 04 min 59.99 sec + 03 hr = 16 day 00 hr 04 min 59.99 sec

The daily ancillary DFLAPMIS file for Day 16 is retrieved because its RangeDateTime overlaps the window between Snew and Enew. The RangeEndingTime of DFLAPMIS on Day 15 at 18Z hours just touches the border of Snew. Using the correlation function, PDPS would determine that Day 16 best matches the PGE processing period beyond Hour 21 of Day 15.

Example 2:

MODIS PGE56 is executed once a day to generate the daily Atmospheres product. The inputs are the MOD08_TL tile granules for the day. The atmosphere team has decided to require matching DFLAPMIS ancillary data as input to PGE56. Two DFLAPMIS daily files are required, one for the day being processed and the next day, which contains data to match the last three hours of the current day. To retrieve the ancillary data to best match the daily Atmosphere product, the following deltas are set for a DPR with a processing period of date: 10/15/98.

S = 15 day 00 hr 00 min 00.00 sec

E = 15 day 23 hr 59 min 59.99 sec

Sdel = (0 * 24 hours) + 3 hr

Edel = (0 * 24 hours) + 3 hr

Snew = 15 day 00 hr 00 min 00.00 sec - 03 hr = 14 day 21 hr 00 min 00.00 sec

Enew = 15 day 23 hr 59 min 59.99 sec + 03 hr = 16 day 02 hr 59 min 59.99 sec

The daily ancillary DFLAPMIS file for Day 15 and Day 16 are retrieved for the PGE run of Day 15 because their RangeDateTime falls within the window from Snew to Enew. Using the correlation function, PDPS would determine that these two files match the data in the processing period.

5.8.4 Case 4: Input ESDT with Associated SingleDateTime and Data Centered on Synoptic Time of File

Case 4 applies to several ancillary data types, including GDAS_0ZF, SEA_ICE, OZ_DAILY, OZONEEP, and FNMOC_ML used by the MODIS PGEs and described in Table 3-4. This type of ancillary data is output from models into a single file per synoptic time. The date and time for which the file is valid is centered on the synoptic time which is stored into the SingleDateTime metadata. The range of time associated with a synoptic time is +/- half of the time interval between the current file at hour Z and the two adjacent files.

GDAS_0ZF has four files per day with the SingleDateTime at 0Z, 6Z, 12Z, and 18Z hours. The time range over which data in each file are valid is +/- 3 hours centered on the synoptic time. SEA_ICE has one file per day with the SingleDateTime at 00Z hours. The time range covered by each file is +/- 12 hours from 00Z hours each day. OZ_DAILY and OZONEEP are daily files of averaged data with the SingleDateTime at 12Z hours each day. The time range covered by these files is 00Z hours to 24Z hours each day. FNMOC_ML is a daily file with a SingleDateTime at 00Z hours. The time range covered by these files is +/- 12 hours from 00Z hours.

The algorithm for retrieval of ancillary data of these types to best match the current processing period of a MODIS PGE and include additional files on either side of the processing period is the same as the general formula. The term for the number of files outside the processing period has the same meaning. The offset interval time "i" is now half the time interval between the Z hour synoptic time and the next Z hour synoptic time. In the final term "p" is the range of time covered by a granules of required input to match the ancillary data. This term is required as an additional offset in the opposite direction from the "i" term to avoid including the SingleDateTime of unwanted outer most ancillary granules which fall very close to or exactly on the border of the extended processing period window.

The following algorithm is used for Case 4:

$$S_{del} = (n * r) + i - p/2$$

$$E_{del} = (n * r) + i - p/2$$

$$S_{new} = S - S_{del}$$

$$E_{new} = E + E_{del}$$

where:

S_{del} = delta time to be set to start of processing period

E_{del} = delta time to be set to end of processing period

S_{new} = start time of processing period with delta time

E_{new} = end time of processing period with delta time

S = start time of processing period

E = end time of processing period

n = number of input files or granules required outside of processing period

r = range of time covered by input file or granule

i = half of the time interval between synoptic times of two consecutive input files

p = nominal time range of a required product granule for the PGE processing period

Example 1:

MODIS PGE03 is executed once for each of 5-minute MODIS L1B Calibrated Radiances granule and MOD03 granule. PGE03 also requires matching ancillary data file of GDAS_OZF as input. For the following start and stop times of typical production periods, the algorithm is used to retrieve the ancillary data file which best matches the MODIS data for a DPR with a processing period of date: 10/15/98.

S = 15 day 08 hr 55 min 00.00 sec

E = 15 day 08 hr 59 min 59.99 sec

S_{del} = $(0 * 6 \text{ hours}) + 3 \text{ hr} - (05 \text{ min}/2) = 02 \text{ hr } 57 \text{ min } 30.00 \text{ sec}$

E_{del} = $(0 * 6 \text{ hours}) + 3 \text{ hr} - (05 \text{ min}/2) = 02 \text{ hr } 57 \text{ min } 30.00 \text{ sec}$

S_{new} = 15 day 08 hr 55 min 00.00 sec - 02 hr 57 min 30.00 sec =
15 day 05 hr 57 min 30.00 sec

E_{new} = 15 day 08 hr 59 min 59.99 sec + 02 hr 57 min 30.00 sec =
15 day 11 hr 57 min 29.99 sec

Only the 6Z GDAS_OZF file for Day 15 has the SingleDateTime within the extended processing period window from S_{new} to E_{new} . Thus, this ancillary file is the only one retrieved for the DPR. This file best matches the processing period.

Example 2:

Using the DPR for Example 1, retrieve the current GDAS_OZF which best matches the MODIS data and one file on each side of the processing period.

$S = 15 \text{ day } 08 \text{ hr } 55 \text{ min } 00.00 \text{ sec}$

$E = 15 \text{ day } 08 \text{ hr } 59 \text{ min } 59.99 \text{ sec}$

$S_{del} = (1 * 6 \text{ hours}) + 3 \text{ hr} - (05 \text{ min}/2) = 08 \text{ hr } 57 \text{ min } 30.00 \text{ sec}$

$E_{del} = (1 * 6 \text{ hours}) + 3 \text{ hr} - (05 \text{ min}/2) = 08 \text{ hr } 57 \text{ min } 30.00 \text{ sec}$

$S_{new} = 15 \text{ day } 08 \text{ hr } 55 \text{ min } 00.00 \text{ sec} - 08 \text{ hr } 57 \text{ min } 30.00 \text{ sec} =$
 $14 \text{ day } 23 \text{ hr } 57 \text{ min } 30.00 \text{ sec}$

$E_{new} = 15 \text{ day } 08 \text{ hr } 59 \text{ min } 59.99 \text{ sec} + 08 \text{ hr } 57 \text{ min } 30.00 \text{ sec} =$
 $15 \text{ day } 17 \text{ hr } 57 \text{ min } 29.99 \text{ sec}$

The 0Z, 6Z, and 12Z GDAS_OZF files for Day 15 have their SingleDateTime within the extended processing period window from Snew to Enew. Thus, these ancillary files are retrieved for the DPR. These files fit the criteria of the best match and one file on either side of the processing period.

Example 3:

MODIS PGE03 runs once for each of 5-minute MODIS L1B Calibrated Radiances granule and MOD03 granule. PGE03 also requires matching ancillary data files of OZ_DAILY as input. The current daily OZ_DAILY file which best matches the MODIS data is needed for the PGE run and one file on either side of the processing period of date: 10/02/98.

$S = 02 \text{ day } 23 \text{ hr } 55 \text{ min } 00.00 \text{ sec}$

$E = 02 \text{ day } 23 \text{ hr } 59 \text{ min } 59.99 \text{ sec}$

$S_{del} = (1 * 24 \text{ hours}) + 12 \text{ hr} - (05 \text{ min}/2) = 35 \text{ hr } 57 \text{ min } 30.00 \text{ sec}$

$E_{del} = (1 * 24 \text{ hours}) + 12 \text{ hr} - (05 \text{ min}/2) = 35 \text{ hr } 57 \text{ min } 30.00 \text{ sec}$

$S_{new} = 02 \text{ day } 23 \text{ hr } 55 \text{ min } 00.00 \text{ sec} - 35 \text{ hr } 57 \text{ min } 30.00 \text{ sec} =$
 $01 \text{ day } 11 \text{ hr } 57 \text{ min } 30.00 \text{ sec}$

$E_{new} = 02 \text{ day } 23 \text{ hr } 59 \text{ min } 59.99 \text{ sec} + 35 \text{ hr } 57 \text{ min } 30.00 \text{ sec} =$
 $04 \text{ day } 11 \text{ hr } 57 \text{ min } 29.99 \text{ sec}$

The OZ_DAILY files on Days 1, 2, and 3, have their SingleDateTime at 12Z hours within the extended processing period window from Snew to Enew. Thus, these three files are retrieved for the DPR. These files fit the criteria of the best match and one file on either side of the processing period.

5.9 Closest Granule Production Rule

A variation of the Advanced Temporal Production Rule is the Closest Granule Production Rule. This rule allows a PGE to request the nearest input granule of an ESDT from the Data Processing Request time. The search is performed either forward or backward in time for a specified time period until it finds a granule that matches the request. A length for the time period of the search must be specified for the query. Currently this rule allows only a search in one direction of time for each PGE execution. ECS plans to update the rule to allow searches in both directions of time for the same execution of a PGE. This upgrade will be a great asset for reprocessing data in the case of a missing file that exactly matches the processing period.

5.10 PGE and ESDT Information To Be Provided by MODIS for the ECS PDPS at SSI&T

The Science Software Development Teams must provide data processing information for each PGE to the DAACs at SSI&T. This information is entered into the PDPS Database when the PGE is registered. The information includes the Production Rules for the PGE and specific details about each of the input and output ESDTs. When the PGE is delivered to one of the DAACs, specific information is supplied in the form of parameters defined by ECS and values supplied by the Science Software Development Teams. These parameters are put into PGE and ESDT files in ODL at SSI&T for use by the PDPS. The Science Teams need only to supply the information in the form of a list of values for the required ECS parameters. For PGEs which require multiple profiles to produce different outputs, at least one of the parameter values will change. Thus, the PGE must be registered for each profile. The DAACs also extract information for the PGE and ESDT ODL files from the PCF by use of an automated SSI&T tool. Some of the parameters contained in the PCF are repeated here as an aid to correlating file names in the SCF PCFs with ESDTs and other information.

The lists in the following sections contain generic parameter names with a description of the information required for MODIS PGEs and items specifying information about the Production Rules for the PGE which will assist the MODIS SDST in preparing documentation to be delivered with the PGEs. An ESDT ODL Parameter section must be supplied for each of the ESDTs which appear in the PCF. Lists of parameters must also be supplied for each runtime parameter. Each of these entities is identified by a Logical ID and a PCF file type. The valid PCF file types are identified by the following integers:

1 Product Input Files

- 2 Product Output Files
- 3 Support Input Files
- 4 Support Output Files
- 5 User Defined Runtime Parameters
- 6 Interim/Intermediate Input Files
- 7 Interim/Intermediate Output Files
- 8 Temporary Input/Output Files

MODIS plans to use only the Product Input Files, Product Output Files, User Defined Runtime Parameters, Interim/Intermediate Input Files, and Interim/Intermediate Output Files.

5.10.1 PGE ODL Parameters

The following are the parameters for PGE ODL:

- PGE_NAME = MODIS team's name for the PGE, identifying the instrument as MODIS (string of maximum length 12); such as "MODIS_PGE16".
- PGE_VERSION = MODIS Team's version of the PGE (string of maximum length 5); such as "2.1"; will increment if a new static granule is supplied or a static runtime parameter is modified.
- PGE_SSW_VERSION = MODIS Team's version of the Science Software (string of maximum length 5); may be the same as the PGE_VERSION such as "2.1"; will increment if the PGE software is changed and rebuilt.
- PLATFORM = Spacecraft platform name; value for MODIS AM-1 launch = "AM-1".
- INSTRUMENT = Instrument name; value for MODIS = "MODIS".
- PROFILE_ID = A number used to identify the PGE profile (integer value).
- PROFILE_DESCRIPTION = A brief description of the profile (string of maximum length 255).
- MINIMUM_OUTPUTS = Minimum number of outputs acceptable for QA of products from one execution of the PGE (maximum 3 digits); typical values range from 0 to 2.
- SCHEDULE_TYPE = Type of Scheduling for the PGE required for top level Production Rule for executing the PGE. PGEs using the tiling production rules always have the type of scheduling set to "Tile" even though they are also executed for a specific time period. Validates for each Production Rule:

Basic Temporal = "Time"

Period (Calendar) Specification = "Time"

Period Start_of_N_Days Specification = "Time"

Orbit-Based = "Orbit"

Latitude/Longitude Tiling = "Tile"

Zonal Tiling = "Tile"

- PROCESSING PERIOD = Nominal time interval between start of PGE runs:
(Valid: SECS, MINS, HOURS, DAYS, WEEKS, THIRDS, MONTHS, YEARS, ORBITS)
Examples: "DAYS=1", "MINS=5"
- PROCESSING BOUNDARY = Nominal time boundary on which PGE processing is scheduled:
(Valid: START_OF_HOUR, START_OF_6HOUR, START_OF_DAY, START_OF_WEEK, START_OF_ONE_THIRD_MONTH, START_OF_MONTH, START_OF_YEAR, START_DATE, START_OF_ORBIT)
- EXIT_CODE = The exit code for the PGE (Valid Range: 0 or 200-239, 0=MODIS PGE completed successfully).
- EXIT_MESSAGE = Message corresponding to the EXIT_CODE (string of maximum length 240); Instrument Teams only provide messages for customized codes which they define (Valid Range: 203-222, all others are system defined).

The following are the parameters for PGEs requiring the Latitude/Longitude Tiling Production Rule:

- QUERY_DELAY = Number of seconds after the end of the processing period to delay before starting the query for input products.
- TILE_SCHEME_NAME = The name given to the tile scheme by the MODIS Team when the Tile Definition is registered.

5.10.2 ESDT ODL Parameters for Product Output Files

- DATA_TYPE_NAME = ESDT ShortName for the product.
- DATA_TYPE_VERSION = ESDT output product version (maximum length 5 characters).
- DATA_TYPE_DESCRIPTION = MODIS team's brief description of the ESDT data collection. Suggested value: ESDT LongName (maximum length 60 characters).
- PCF_FILE_TYPE = Integer by which PDPS recognizes the type of file (Valid for product output file = 2).

- HDF_DATA = Is the product in HDF format (Valid: "Y", "N")?
- LOGICAL_ID = Logical unit number for the product (in PCF).
- ASSOCIATED_MCF_ID = Logical unit number for the product's MCF (in PCF).
- MAX_GRANULE_YIELD = Maximum number of output file instances expected (automatically extracted from PCF).
- MIN_GRANULE_YIELD = Minimum number of granules to be output for PGE run to be considered as successful; may be 0 if granules are not always expected.
- SCIENCE_GROUP = Classification of product output [Valid: ("S"-Science file, "Q"-QA File, "H"-Production History file, "B"-Browse file), and (Number of file within the group - Valid Range: 1-999) Example: "S1"]
- NOMINAL_SIZE = Nominal file size in MB for this product (integer value).
- MINIMUM_SIZE = Minimum (approximate) file size in MB for this product (integer value).
- MAXIMUM_SIZE = Maximum (approximate) file size in MB for this product (integer value).
- FILETYPE_NAME = Brief description of type of data stored in the file (maximum length 20 characters). If a granule contains more than one file, this information should be included here. Examples: "Instrument Band 7", "Multifile Granule".
- INSTANCE = Nominal number of file instances with different Logical IDs, but these files are associated with each other. INSTANCE is set to 0 if this parameter is to be ignored (Default: 0).

5.10.3 ESDT ODL Parameters for Product Input Files

- DATA_TYPE_NAME = ESDT ShortName for the input product.
- DATA_TYPE_VERSION = ESDT input product version (maximum length 5 characters).
- DATA_TYPE_DESCRIPTION = MODIS team's brief description of the ESDT data collection. Suggested value: ESDT LongName (maximum length 60 characters).
- PCF_FILE_TYPE = Integer by which PDPS recognizes the type of file (Valid for product input files = 1).
- LOGICAL_ID = Logical unit number for the input product (in PCF).
- DATA_TYPE_REQUIREMENT = Nominal number of input file instances for this logical unit number (in PCF).
- INPUT TYPE = Type of input file (Valid: Required, Optional, Primary, Alternate)

- FILETYPE_NAME = Brief description of type of data stored in the file (maximum length 20 characters). If a granule contains more than one file, this information should be included here. Examples: "Instrument Band 7", "L0 Multifile Granule".
- QUERY_TYPE = Method by which data are retrieved and staged for input (Valid: "Temporal", "Spatial", "Tile", "Already Created Tile", Default: "Temporal")
- MAX_GRANULES_REQUIRED = Maximum number of input granules for this ESDT. Value can be obtained from the PCF.

To run the PGE without a full set of Required inputs or without the Optional inputs:

- CATEGORY = Name for grouping inputs (string of maximum length 40).
- MIN_GRANULES_REQUIRED = Minimum Number of Granules of this ESDT required to be available before the PGE is executed (N/A to Optional). For PGEs using the Latitude/Longitude Tiling Production Rule, this parameter should be set to one.
- TIMER = Wait time for Minimum Number of Granules of required input to be available or for execution or wait time for execution without Optional inputs (Valid: MONTHS, WEEKS, DAYS, HOURS, MINS, SECS)

Examples: "DAYS=1", "MINS=2"

- TEMPORAL = Temporal flag indicating if the optional file should be the previous version of the data product (Valid: "Y" or "N").

If the Alternate Inputs Production Rule is required:

- CATEGORY = Name of the Alternate Category (string of maximum length 40).
- ORDER = Order of preference for alternates (Primary must have Order = 1; others have order = 2...n).
- TIMER = Wait time for this Alternate Input to be available before the countdown for the next Alternate begins (Valid: MONTHS, WEEKS, DAYS, HOURS, MINS, SECS).

Examples: "DAYS=1", "MINS=2"

- WAIT FOR = Wait For flag which informs PDPS to wait for the alternate input regardless of the timer value (Valid: "Y" or "N"; MODIS Default: "N").
- TEMPORAL = Temporal flag indicating whether the alternate should be previous version of the data product rather than the most current version (Valid: "Y" or "N").

- MIN_GRANULES_REQUIRED = Minimum Number of Granules of this ESDT required to be available on time-out before the countdown for the next Alternate begins.
- RUNTIME_PARM_ID = Runtime Parameter Logical ID to hold the Logical ID of the alternate input or optional input. A corresponding Runtime Parameter must be defined in the PCF. Since a value for this parameter is required by PDPS, MODIS will use a flag value of 999999 to indicate that this parameter is not used (Valid Range: 1-9999, 11000-999999)

If the type is primary, the following parameter is also needed:

- NUMBER_NEEDED = Number of Alternate Inputs needed (Valid: 0, 1); at most, one alternate may be used.

If the Advanced Temporal Production Rule is required:

- BEGIN_PERIOD_OFFSET = Delta time to be applied to start of processing period (+ moves date/time forward, - moves date/time backward, 0 is default).
- END_PERIOD_OFFSET = Delta time to be applied to end of processing period (+ moves date/time forward, - moves date/time backward, 0 is default).

If the input file is a static file, the following parameter is also needed:

- SCIENCE_GROUP = Type of Static file [Valid: ("C" - Coefficient file, "L" - Lookup file, "D" - Database file, "O" - Other type file) and (number of file within the group - Valid Range: 1-999) Example "C1"].

5.10.4 ESDT ODL Parameters for Interim/Intermediate Files

For Interim/Intermediate type of files the following additional information needs to be supplied:

- DATA_TYPE_NAME = ESDT ShortName for the product.
- DATA_TYPE_VERSION = ESDT output product version (maximum length 5 characters).
- INTERIM SHORT DURATION = Minimum time the granules are to be kept before being deleted when they are no longer needed.
- INTERIM LONG DURATION = Longest time that granules must be kept for possible future use before being deleted.
- INTERIM LAST PGE TO USE = Parameter that defines if this PGE is the last to use this Interim data type (Valid: "Y" or "N").

5.10.5 ESDT ODL Parameters for Metadata-Based Activation

Metadata_Checks are performed on the Inventory metadata attributes or PSAs in granules of a particular ESDT. If the resulting value matches the metadata check value, the PGE is activated. If not, the PGE is not activated.

- PARM_NAME = Name of metadata parameter or attribute on which this execution of the PGE depends (maximum length 40 characters).
- OPERATOR = Operator for the query dependency condition (Valid: >, <, >=, <=, ==, !=).
- VALUE = Value for parameter or attribute in the ESDT upon which the PGE activation or inclusion of granules in the PGE run depends.

This value may be overridden by specifying a query to be performed on a parameter in the PDPS Database rather than the value above.

- DATABASE_QUERY = PDPS Database parameter (Valid: NONE, TILE ID, ORBIT NUMBER, PATH NUMBER, DATA DAY).

5.10.6 ESDT ODL Parameters for Metadata-Based Query

A Metadata-Based Query is performed on the Inventory metadata attributes or PSAs in granules of a particular ESDT to select granules which meet the query criteria. The parameters in this section are included in the Product Input File list for the ESDT which contains the parameters or attributes to be used in the query for selecting granules for the PGE execution.

- PARM_NAME = Name of metadata parameter or attribute on which this execution of the PGE depends (maximum length 40 characters).
- OPERATOR = Operator for the query dependency condition (Valid: >, <, >=, <=, ==, !=).
- VALUE = Value for parameter or attribute in the ESDT upon which the PGE activation or inclusion of granules in the PGE run depends.

This value may be overridden by specifying a query to be performed on a parameter in the PDPS Database rather than the value above.

- DATABASE_QUERY = PDPS Database parameter (Valid: NONE, TILE ID, ORBIT NUMBER, PATH NUMBER, DATA DAY).

5.10.7 ESDT ODL Parameters for Runtime Parameters

The Runtime parameters to be used in the Production Rule must be included in the PCF for the PGE. If the Runtime parameter is not to be changed, the information from the

PCF is automatically put into the PGE ODL file and then into the PDPS Database by SSI&T software. Overrides of Runtime Parameters occur when Production Requests are entered. The information for a dynamic insert of a value for a Runtime Parameter when the PGE is executed must be supplied to the DAAC. The use of the Tiling and Data Day Production Rules enable the PDPS to automatically insert values of runtime parameters. For special processing requests, the operator may override the values in the Runtime Parameters when the production request is created.

- LOGICAL_ID = Logical unit number for the Runtime Parameter (in PCF).
- PGE_PARAMETER_NAME = Name of the Runtime Parameter for which the value is to be inserted at the PGE execution.
- PGE_PARAMETER_DEFAULT = User deferred default value for the PGE.
- PGE_PARAMETER_DYNAMIC_VALUE = Value to be inserted by PDPS (Validated by MODIS: "TILE ID", "ORBIT NUMBER", "DATA DAY", "NONE"); (maximum length 200 characters).

For each of these values, the PDPS is to take the following action:

- TILE ID - Retrieve the ID of the tile.
- ORBIT NUMBER - Retrieve the number of the orbit.
- DATA DAY - Retrieve the data day.
- NONE - No dynamic value, use default.

6 System Performance

6.1 Performance Factors

Nominal performance can be evaluated based upon whether the planned product processing is being carried out on schedule and all the required products are produced. Errors will be reported to the SMF log files and the system monitoring utilities should indicate that the PGE completed abnormally. Only under abnormal conditions should operator intervention be required. (Refer to Section 7, System Operation.)

6.2 Resource Utilization

The resource requirements for the MODIS processes are maintained in a separate MODIS Product Volumes and Loads Estimate database. This information shall be provided to ECS and the appropriate DAACs as part of the software deliveries.

7 System operation

The MODIS SDP S/W currently runs in the MODIS TLSCF under MODAPS V2 and in the DAACs under control of the SDPS, as discussed in Section 1. The activation rules for each PGE will be incorporated into Production Rules during the development of the PGE scripts, Loaders, and Recipes for MODAPS and during SSI&T at the GFSC DAAC. The production rules which are required by MODIS and are currently available are Basic Temporal, Advanced Temporal, Closest Granule, Orbit-Based Activation, Period Specification, Start_of_N_Days, Smart_Start_of_Year, Optional Inputs, Alternate Inputs, Latitude/Longitude Tiling, Zonal Tiling, Metadata Based Activation, Metadata Based Query, Minimum-Number of Granules, Runtime Parameters, and Data Day (special case of runtime parameters). The production scenario for each of the PGEs delivered to MODAPS or to the GSFC DAAC will be built from the Production Rules as described in this SDD. The detailed information delivered with the PGE to the DAAC is fine-tuned at SSI&T. If necessary, MODAPS provides customized production scenarios for individual PGEs.

The PGE error reporting in the SDP S/W is limited to success or failure. MODIS PGEs will return a value of 0 for success. PGE processes will return a value of 1 for failure. Instructions for each error message requiring action by the DAAC operations staff will be provided with the PGE delivery. In general, PGEs that return failure in the DAAC will require manual investigation by DAAC, ECS, and MODIS personnel. These instructions are also used by the MODAPS operations staff.

The MODAPS and DAAC operations will include monitoring data product transfers. There will be MODAPS to DAAC, DAAC to MODAPS, MODAPS to SCF, and DAAC to SCF transfers. The MODIS Level 1, Oceans, and Atmosphere products will be archived at GSFC. Most of the Standard MODIS Level 1 Products will be transferred from the GSFC DAAC to MODAPS for the processing of the Level 2 to Level 4 MODIS products. All of the Standard MODIS Land Products are archived at either the EDC DAAC or the NSIDC DAAC. All of the Standard Atmosphere and Oceans Products are archived at the GSFC DAAC.

Table 7-1 lists the MODIS Level 1 products and the Level 2 Cloud Mask and Atmospheric Profiles to be transferred from the GSFC DAAC to MODAPS. Table 7-2 lists the MODIS Land Products which are transferred from MODAPS to the EDC and NSIDC DAACs for archive and distribution. Table 7-3 lists the MODIS Atmosphere products which are transferred from MODAPS to the GSFC DAAC for archive and

distribution. Table 7-4 lists the MODIS Oceans products which are transferred from MODAPS to the GSFC DAAC for archive and distribution.

There are also interim products that are produced by the MODIS science software. These interim products are stored at the MODAPS facility until they are no longer needed by downstream processing and the MODIS Discipline Teams have completed the QA for these interim and the associated science archive products. There are a few interim MODIS products produced by PGEs running at the GSFC DAAC. These interim products are archived for short periods of time at the DAAC. Others are sent to validation sites. Some interim products produced at MODAPS are transferred and archived for short periods at the DAACs. Table 7-5 lists the Level 1 products that are not transferred to MODAPS for processing. Tables 7-6 to 7-8 list the Land, Atmosphere, and Oceans interim products, respectively.

Table 7-1. MODIS Level 1 and Level 2 Products Transferred from the GSFC DAAC to MODAPS

PGE	Long Name/Product Description	ESDT	Process ID	Production DAAC	Archive DAAC
PGE01	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km	MOD03	MOD_PR03	GSFC	GSFC
PGE02	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km	MOD021KM	MOD_PR02	GSFC	GSFC
PGE02	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 500m	MOD02HKM	MOD_PR02	GSFC	GSFC
PGE02	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250m	MOD02QKM	MOD_PR02	GSFC	GSFC
PGE03	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km	MOD35_L2	MODPR_35	GSFC	GSFC
PGE03	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km	MOD07_L2	MOD_PR07	GSFC	GSFC

Table 7-2. MODIS Land Products Transferred from MODAPS to EDC and NSIDC DAACs

PGE	Long Name/Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE07	MODIS/Terra Snow Cover 5-Min L2 Swath 500m	MOD10_L2	MOD_PR10	MODAPS	NSIDC
PGE08	MODIS/Terra Sea Ice Extent 5-Min L2 Swath 1km	MOD29	MOD_PR29	MODAPS	NSIDC
PGE12	MODIS/Terra Geolocation Angles Daily L2G Global 1km ISIN Grid Day	MODMGGAD	MOD_PRMGR	MODAPS	EDC
PGE12	MODIS/Terra Geolocation Angles Daily L2G Global 1km Grid Night	MODMGGAN	MOD_PRMGR	MODAPS	EDC
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 1km ISIN Grid Day	MODPT1KD	MOD_PRMGPNTR	MODAPS	EDC
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 1km ISIN Grid Night	MODPT1KN	MOD_PRMGPNTR	MODAPS	EDC
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 500m ISIN Grid	MODPTHKM	MOD_PRMGPNTR	MODAPS	EDC
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 250m ISIN Grid	MODPTQKM	MOD_PRMGPNTR	MODAPS	EDC
PGE13	MODIS/Terra Surface Reflectance Daily L2G Global 500m ISIN Grid	MOD09GHK	MOD_PRMGR	MODAPS	EDC
PGE13	MODIS/Terra Surface Reflectance Daily Global 250m ISIN Grid	MOD09GQK	MOD_PRMGR	MODAPS	EDC
PGE13	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km ISIN Grid	MOD09GST	MOD_PRMGR	MODAPS	EDC
PGE13	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km ISIN Grid Day	MOD14GD	MOD_PRMGR	MODAPS	EDC
PGE13	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km ISIN Grid Night	MOD14GN	MOD_PRMGR	MODAPS	EDC
PGE16	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 1km ISIN Grid	MOD11A1	MOD_PR11	MODAPS	EDC
PGE16	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 5km ISIN Grid	MOD11B1	MOD_PR11	MODAPS	EDC

**Table 7-2. MODIS Land Products Transferred from MODAPS to EDC and NSIDC
DAACs (Continued)**

PGE	Long Name/Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE16	MODIS/Terra Land Surface Temperature/Emissivity 5-Min L2 Swath 1km	MOD11_L2	MOD_PR11	MODAPS	EDC
PGE21	MODIS/Terra Surface Reflectance 8-Day L3 Global 500m ISIN Grid	MOD09A1	MOD_PR09A	MODAPS	EDC
PGE21	MODIS/Terra Surface Reflectance 8-Day L3 Global 250m ISIN Grid	MOD09Q1	MOD_PR09A	MODAPS	EDC
PGE23	MODIS/Terra BRDF/Albedo Model-1 16-Day L3 Global 1km ISIN Grid	MOD43B1	MOD_PR43B	MODAPS	EDC
PGE23	MODIS/Terra BRDF/Albedo Model-2 16-Day L3 Global 1km ISIN Grid	MOD43B2	MOD_PR43B	MODAPS	EDC
PGE23	MODIS/Terra Albedo 16-Day L3 Global 1km ISIN Grid	MOD43B3	MOD_PR43B	MODAPS	EDC
PGE23	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 1km ISIN Grid	MOD43B4	MOD_PR43B	MODAPS	EDC
PGE24	MODIS/Terra BRDF/Albedo 16-Day L3 Global 28km CMG	MOD43C1	MOD_PR43C	MODAPS	EDC
PGE25	MODIS/Terra Vegetation Indices 16-Day L3 Global 250m ISIN Grid	MOD13Q1	MOD_PR13A1	MODAPS	EDC
PGE25	MODIS/Terra Vegetation Indices 16-Day L3 Global 500m ISIN Grid	MOD13A1	MOD_PR13A1	MODAPS	EDC
PGE26	MODIS/Terra Vegetation Indices Monthly L3 Global 1km ISIN Grid	MOD13A3	MOD_PR13A3	MODAPS	EDC
PGE27	MODIS/Terra Vegetation Indices 16-Day L3 Global 28km CMG	MOD13C2	MOD_PR13C2	MODAPS	EDC

Table 7-2. MODIS Land Products Transferred from MODAPS to EDC and NSIDC DAACs (Continued)

PGE	Long Name/Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE28	MODIS/Terra Vegetation Indices Monthly L3 Global 28km CMG	MOD13C3	MOD_PR13C3	MODAPS	EDC
PGE29	MODIS/Terra Thermal Anomalies/Fire Daily L3 Global 1km ISIN Grid	MOD14A1	MOD_PR14A	MODAPS	EDC
PGE29	MODIS/Terra Thermal Anomalies/Fire 8-Day L3 Global 1km ISIN Grid	MOD14A2	MOD_PR14A	MODAPS	EDC
PGE30	MODIS/Terra Thermal Anomalies/Fire 5-Min L2 Swath 1km	MOD14	MOD_PR14	MODAPS	EDC
PGE31	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 1km ISIN Grid	MOD11A2	MOD_PR11A	MODAPS	EDC
PGE32	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 56km CMG	MOD11C1	MOD_PR11C	MODAPS	EDC
PGE34	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 1km ISIN Grid	MOD15A2	MOD_PR15A2	MODAPS	EDC
PGE35	MODIS/Terra Vegetation Indices 16-Day L3 Global 1km ISIN Grid	MOD13A2	MOD_PR13A2	MODAPS	EDC
PGE37	MODIS/Terra Net Photosynthesis 8-Day L4 Global 1km ISIN Grid	MOD17A2	MOD_PR17A2	MODAPS	EDC
PGE38	MODIS/Terra Net Primary Production Yearly L4 Global 1km ISIN Grid	MOD17A3	MOD_PR17A3	MODAPS	EDC
PGE39	MODIS/Terra Net Photosynthesis 8-Day L4 Global 56km CMG	MOD17C2	MOD_PR17C2	MODAPS	EDC
PGE41	MODIS/Terra Land Cover Type 96-Day L3 Global 1km ISIN Grid	MOD12Q1	MOD_PR12Q	MODAPS	EDC
PGE41	MODIS/Terra Land Cover Change 96-Day L3 Global 1km ISIN Grid	MOD12Q2	MOD_PR12Q	MODAPS	EDC
PGE42	MODIS/Terra Land Cover Type 96-Day L3 Global 56km CMG	MOD12C1	MOD_PR12C	MODAPS	EDC
PGE42	MODIS/Terra Land Cover Change 96-Day L3 Global 56km CMG	MOD12C2	MOD_PR12C	MODAPS	EDC
PGE43	MODIS/Terra Snow Cover Daily L3 Global 500m ISIN Grid	MOD10A1	MOD_PR10A1	MODAPS	NSIDC
PGE44	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Day	MOD29P1D	MOD_PR29A1	MODAPS	NSIDC
PGE44	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Night	MOD29P1N	MOD_PR29A1	MODAPS	NSIDC

Table 7-2. MODIS Land Products Transferred from MODAPS to EDC and NSIDC DAACs (Continued)

PGE	Long Name/Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE45	MODIS/Terra Snow Cover 8-Day L3 Global 500m ISIN Grid	MOD10A2	MOD_PR10A2	MODAPS	NSIDC
PGE46	MODIS/Terra Snow Cover Daily L3 Global 28km CMG	MOD10C1	MOD_PR10C1	MODAPS	NSIDC
PGE47	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1km EASE-Grid Day	MOD29P2D	MOD_PR29A2	MODAPS	NSIDC
PGE47	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1km EASE-Grid Night	MOD29P2N	MOD_PR29A2	MODAPS	NSIDC
PGE48	MODIS/Terra Sea Ice Extent Daily L3 Global 28km CMG Day	MOD29C1D	MOD_PR29C1	MODAPS	NSIDC
PGE48	MODIS/Terra Sea Ice Extent Daily L3 Global 28km CMG Night	MOD29C1N	MOD_PR29C1	MODAPS	NSIDC
PGE58	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 56km CMG	MOD11C2	MOD_PR11C2	MODAPS	EDC
PGE59	MODIS/Terra Land Surface Temperature/Emissivity 32-Day L3 Global 56km CMG	MOD11C3	MOD_PR11C3	MODAPS	EDC
PGE61	MODIS/Terra Vegetation Continuous Field Yearly L4 Global 1km ISIN Grid	MOD44B	MOD_PR44B	MODAPS	EDC
PGE62	MODIS/Terra Thermal Anomalies/Fire 32-Day L3 Global 28km CMG	MOD14C3	MOD_PR14C	MODAPS	EDC
PGE63	MODIS/Terra Leaf Area Index/FPAR Monthly L4 Global 56km CMG	MOD15C2	MOD_PR15C2	MODAPS	EDC
PGE64	MODIS/Terra Net Primary Production Yearly L4 Global 56km CMG	MOD17C3	MOD_PR17C3	MODAPS	EDC
PGE65	MODIS/Terra BRDF/Albedo 32-Day L3 Global 28km CMG	MOD43C2	MOD_PR43C	MODAPS	EDC
PGE66	MODIS/Terra Vegetation Cover Conversion 32-Day L4 Global 250m ISIN Grid	MOD44A	MOD_PR44A	MODAPS	EDC
PGE67	MODIS/Terra Snow Cover 8-Day L3 Global 28km CMG	MOD10C2	MOD_PR10C2	MODAPS	NSIDC
PGE68	MODIS/Terra Sea Ice Extent 8-Day L3 Global 28km CMG Day	MOD29C2D	MOD_PR29C2	MODAPS	NSIDC
PGE68	MODIS/Terra Sea Ice Extent 8-Day L3 Global 28km CMG Night	MOD29C2N	MOD_PR29C2	MODAPS	NSIDC

Table 7-3. MODIS Atmosphere Products Transferred from MODAPS to GSFC DAAC

PGE	Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE04	MODIS/Terra Aerosol 5-Min L2 Swath 10km	MOD04_L2	MODPR04_05	MODAPS	GSFC
PGE04	MODIS/Terra Total Precipitable Water Vapor 5-Min L2 Swath 1km and 5km	MOD05_L2	MODPR04_05	MODAPS	GSFC
PGE06	MODIS/Terra Cloud 5-Min L2 Swath 1km and 5km	MOD06_L2	MOD_PR06CT, MOD_PR06CD, MOD_PR06OD	MODAPS	GSFC
PGE56	MODIS/Terra Aerosol Cloud Water Vapor Ozone Daily L3 Global 1Deg CMG	MOD08_D3	MOD_PR08D	MODAPS	GSFC
PGE57	MODIS/Terra Aerosol Cloud Water Vapor Ozone Monthly L3 Global 1Deg CMG	MOD08_M3	MOD_PR08M	MODAPS	GSFC
PGE70	MODIS/Terra Aerosol Cloud Water Vapor Ozone 8-Day L3 Global 1Deg CMG	MOD08_E3	MOD_PR08E	MODAPS	GSFC

Table 7-4. MODIS Ocean Products Transferred from MODAPS to GSFC DAAC

PGE	Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE09	MODIS/Terra Ocean Color Radiance Products 5-Min L2 Swath 1km Day	MODOCL2	MOD_PR18	MODAPS	GSFC
PGE09	MODIS/Terra Ocean Color Derived Products Group 1 5-Min L2 Swath 1km Day	MODOCL2A	MOD_PR18	MODAPS	GSFC
PGE09	MODIS/Terra Ocean Color Derived Products Group 2 5-Min L2 Swath 1km Day	MODOCL2B	MOD_PR18	MODAPS	GSFC
PGE09	MODIS/Terra Ocean Color QC Products 5-Min L2 Swath 1km Day	MODOCQC	MOD_PR18	MODAPS	GSFC
PGE10	MODIS/Terra Sea Surface Temperature Products 5-Min L2 Swath 1km	MOD28L2	MOD_PR28	MODAPS	GSFC
PGE10	MODIS/Terra Sea Surface Temperature QC Products 5-Min L2 Swath 1km	MOD28QC	MOD_PR28	MODAPS	GSFC
PGE17	NMC ancillary data for MODIS Oceans processing	MODOCNMC	MOD_PRNMC	MODAPS	GSFC
PGE19	TOMS ozone data for MODIS Oceans processing	MODOCOZN	MOD_PROZN	MODAPS	GSFC

Table 7-4. MODIS Ocean Products Transferred from MODAPS to GSFC DAAC
(Continued)

PGE	Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE20	MODIS/Terra Interim Ocean Color and SST QC Mean Map Daily L3 Global 4km CylEqDis	MO04MAqq (where qq=41...61, 63...66,69...78)	MOD_Prmmap	MODAPS	GSFC
PGE20	MODIS/Terra Interim Composite Ocean Color QC Products Daily L3 Global 4km ISEAG	MODOQAqq (where qq=51...61, 63...66)	MOD_Prmtbin	MODAPS	GSFC
PGE20	MODIS/Terra Interim Sea Surface Temperature QC Product Daily L3 Global 4km ISEAG	MODSQArr (where rr=D1...D9, DA, N1...N9, NA)	MODPrmtbin	MODAPS	GSFC
PGE51	MODIS/Terra Ocean Weekly Productivity Indices 8-Day L4 Global 4km ISEAG	MOD27W	MOD_PR27W	MODAPS	GSFC
PGE51	MODIS/Terra Ocean Annual Productivity Indices Yearly L4 Global 4km ISEAG	MOD27Y	MOD_PR27Y	MODAPS	GSFC
PGE51	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 4km CylEqDis	MOAPWAxx (where xx = M1,M2,ME,MD, N1,N2,F1,F2)	MOD_PR27W	MODAPS	GSFC
PGE51	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 36km CylEqDis	MOAPWBxx (where xx = M1,M2,ME,MD, N1,N2,F1,F2)	MOD_PR27W	MODAPS	GSFC
PGE51	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 1Deg CylEqDis	MOAPW1xx (where xx = M1,M2,ME,MD, N1,N2,F1,F2)	MOD_PR27W	MODAPS	GSFC
PGE51	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 4km CylEqDis	MOAPYAyy (where yy = M1,M2,S1,S2, W1,W2,N1,N2, F1,F2)	MOD_PR27Y	MODAPS	GSFC

Table 7-4. MODIS Ocean Products Transferred from MODAPS to GSFC DAAC**(Continued)**

PGE	Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE51	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 36km CylEqDis	MOAPYByy (where yy = M1,M2,S1,S2, W1,W2,N1,N2, F1,F2)	MOD_PR27Y	MODAPS	GSFC
PGE51	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 1Deg CylEqDis	MOAPY1yy (where yy = M1,M2,S1,S2, W1,W2,N1,N2, F1,F2)	MOD_PR27Y	MODAPS	GSFC
PGE52	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 4km CylEqDis	MOSPYAxx (where xx = MP,MN,MX,MC, SC,WC,NC,FC)	MOD_PR27HV	MODAPS	GSFC
PGE52	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 36km CylEqDis	MOSPYBxx (where xx = MP,MN,MX,MC, SC,WC,NC,FC)	MOD_PR27HV	MODAPS	GSFC
PGE52	MODIS/Terra Ocean Statistical Primary Production Yearly L4 Global 1Deg CylEqDis	MOSPY1xx (where xx = MP,MN,MX,MC, SC,WC,NC,FC)	MOD_PR27HV	MODAPS	GSFC
PGE52	MODIS/Terra Ocean Chlorophyll Running Year Average 8-Day L3 Global 4km ISEAG	MODOCY27	MOD_Prmtbin	MODAPS	GSFC
PGE52	MODIS/Terra Ocean Annual Empirical Productivity 8-Day L4 Global 4km ISEAG	MOD27HV	MOD_PR27HV	MODAPS	GSFC
PGE53	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Daily L3 Global 4km ISEAG	MODOCdnn (where nn=1...36)	MOD_Prmcloud	MODAPS	GSFC
PGE53	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 Daily L3 Global 4km ISEAG	MOD28Dmm (where mm=D1, D2, N1, or N2)	MODPRmcloud	MODAPS	GSFC
PGE53	MODIS/Terra Ocean Color and SST {Mean}Maps Daily L3 Global {1km} CylEqDis {Std. Dev.} {36km} {Number} {1Deg} {Quality} {CommonFlags} {Flag Byte1} {Flag Byte2} {Flag Byte3}	MO{04, 36, 1D} {M, S, N,Q, F, 1, 2, 3,} D## (where ##= 1 ... 36 or D1, D2, N1, or N2)	MOD_Prmmap	MODAPS	GSFC

Table 7-4. MODIS Ocean Products Transferred from MODAPS to GSFC DAAC**(Continued)**

PGE	Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE54	MODIS/Terra Ocean Color QC'd Composite Params 1-36 8-Day L3 Global 4km ISEAG	MODOCWnn (where nn=1...36)	MOD_Prmtbin	MODAPS	GSFC
PGE54	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 8-Day L3 Global 4km ISEAG	MOD28Wmm (where mm=D1, D2, N1, or N2)	MOD_Prmtbin	MODAPS	GSFC
PGE54	MODIS/Terra Ocean Color and SST {Mean}Maps 8-Day L3 Global {1km} CylEqDis {Std. Dev.} {36km} {Number} {1Deg} {Quality} {CommonFlags} {Flag Byte1} {Flag Byte2} {Flag Byte3}	MO{04, 36, 1D} {M,S,N,Q,F,1,2,3} W## (where ## = 1...36 or D1, D2, N1, or N2)	MOD_Prmmmap	MODAPS	GSFC
PGE73	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Monthly L3 Global 4km ISEAG	MODOCMnn (where nn= 1...36)	MOD_Prmtbin	MODAPS	GSFC
PGE73	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 Monthly L3 Global 4km ISEAG	MOD28Mmm (where mm=D1,D2,N1 or N2)	MOD_Prmtbin	MODAPS	GSFC
PGE73	MODIS/Terra Ocean Color and SST {Mean}Maps Monthly L3 Global {1km} CylEqDis {Std. Dev.} {36km} {Number} {1Deg} {Quality} {CommonFlags} {Flag Byte1} {Flag Byte2} {Flag Byte3}	MO {04,36,1D}{M,S, N,Q,F,1,2,3} M## (where##=1...36, D1,D2,N1,N2)	MOD_Prmmmap	MODAPS	GSFC

Table 7-4. MODIS Ocean Products Transferred from MODAPS to GSFC DAAC
(Continued)

PGE	Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE74	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Yearly L3 Global 4km ISEAG	MODOCNnn (where nn=1...36)	MOD_Prmtbin	MODAPS	GSFC
PGE74	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 Yearly L3 Global 4km ISEAG	MOD28Nmm (where mm=D1,D2,N1, N2)	MOD_Prmtbin	MODAPS	GSFC
PGE74	MODIS/Terra Ocean Color and SST {Mean}Maps Yearly L3 Global {1km} CylEqDis {Std. Dev.} {36km} {Number} {1Deg} {Quality} {CommonFlags} {Flag Byte1} {Flag Byte2} {Flag Byte3}	MO {04,36,1D}{M,S, N,Q,F,1,2,3} N## (where ##=1...36,D1,D2, N1,N2)	MOD_Prmmmap	MODAPS	GSFC

Table 7-5. MODIS Level 1 Products Not Transferred for Processing

PGE	Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE01	MODIS/Terra Raw Radiances in Counts 5-Min L1A Swath	MOD01	MOD_PR01	GSFC	GSFC
PGE02	MOD/Terra QA Summary of Calibrated Radiances 1km	MOD021QA	MOD_PR02	GSFC	GSFC
PGE02	MODIS/Terra On-Board Calibrator and Engineering Data	MOD02OBC	MOD_PR02	GSFC	GSFC
PGE03	MODIS/Terra Cloud Mask and Spectral Test Diagnostics 5-Min L2 250m and 1km	MOD35_QC	MOD_PR35	GSFC	GSFC
PGE03	MODIS/Terra Vertical Profiles Diagnostics 5-Min L2 5km	MOD07_QC	MOD_PR07	GSFC	GSFC
PGE03	MODIS/Terra Clear Sky Radiance Statistics 5-Min L2 25km	MODCSR_G	MOD_PRCsr	GSFC	GSFC
PGE03	MODIS/Terra Volcano Alert 5Min L2	MODVOLC	MOD_PrvOLC	GSFC	GSFC (Interim)

Table 7-5. MODIS Level 1 Products Not Transferred for Processing
(Continued)

PGE	Product Description	ESDT	Process ID	Production Center	Archive DAAC
PGE71	MODIS/Terra Subsetted Raw Radiances in Counts 5-Min L1A Swath	MOD01SS	MOD_PR01SS	GSFC	GSFC

Table 7-6. MODIS Land Interim Products

PGE	Product Description	ESDT	Process ID	Production Center
PGE07	MODIS/Terra Coarse Snow Cover 5-Min L2 Swath 5km	MOD10L2C	MOD_PR10	MODAPS
PGE08	MODIS/Terra Coarse Sea Ice Extent 5-Min L2 Swath 5km	MOD29L2C	MOD_PR29	MODAPS
PGE11	MODIS/Terra Coarse Calibrated Radiances 5-Min L2 Swath 5km	MOD02CRS	MOD_PR02CRS	MODAPS
PGE11	MODIS/Terra Subsampled Coarse Calibrated Radiances 5-Min L2 Swath 5km	MOD02CSS	MOD_PR02CRS	MODAPS
PGE11	MODIS/Terra Surface Reflectance 5-Min L2 Swath 250m, 500m and 1km	MOD09	MOD_PR09	MODAPS
PGE11	MODIS/Terra Coarse Surface Reflectance 5-Min L2 Swath 5km	MOD09CRS	MOD_PR09	MODAPS
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Day	MODPTPGD	MOD_PRMGPNTR	MODAPS
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Night	MODPTPGN	MOD_PRMGPNTR	MODAPS
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 500m EASE-Grid Day	MODPTPHD	MOD_PRMGPNTR	MODAPS
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 500m EASE-Grid Night	MODPTPHN	MOD_PRMGPNTR	MODAPS
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 250m EASE-Grid Day	MODPTPQD	MOD_PRMGPNTR	MODAPS
PGE12	MODIS/Terra Observation Pointers Daily L2G Global 250m EASE-Grid Night	MODPTPQN	MOD_PRMGPNTR	MODAPS
PGE12	MODIS/Terra Geolocation Angles Daily L2G Global 1km EASE-Grid Day	MODMGPGD	MOD_PRMGR	MODAPS
PGE12	MODIS/Terra Geolocation Angles Daily L2G Global 1km EASE-Grid Night	MODMGPGN	MOD_PRMGR	MODAPS

Table 7-6. MODIS Land Interim Products
(Continued)

PGE	Product Description	ESDT	Process ID	Production Center
PGE14	MODIS/Terra Snow Cover Daily L2G Global 500m ISIN Grid	MOD10L2G	MOD_PRMGR	MODAPS
PGE15	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Day	MOD29PGD	MOD_PRMGR	MODAPS
PGE15	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Night	MOD29PGN	MOD_PRMGR	MODAPS
PGE16	MODIS/Terra Land Surface Temperature Update Files L3 Global 1km ISIN Grid	MOD11UPD	MOD_PR11	MODAPS
PGE21	MODIS/Terra Coarse Surface Reflectance 8-Day L3 Global 5km ISIN Grid	MOD09A1C	MOD_PR09A	MODAPS
PGE21	MODIS/Terra Coarse Surface Relectance 8-Day L3 Global 5km ISIN Grid	MOD09Q1C	MOD_PR09A	MODAPS
PGE22	MODIS/Terra BRDF Preprocessing Database Daily L3 Global 1km ISIN Grid	MODAGAGG	MOD_PRAGG	MODAPS
PGE22	MODIS/Terra BRDF Texture Database Daily L3 Global 1km ISIN Grid	MODAGTEX	MOD_PRAGG	MODAPS
PGE23	MODIS/Terra Coarse BRDF/Albedo Model-1 16-Day L3 Global 5km ISIN Grid	MOD43B1C	MOD_PR43B	MODAPS
PGE23	MODIS/Terra Coarse Albedo 16-Day L3 Global 5km ISIN Grid	MOD43B3C	MOD_PR43B	MODAPS
PGE23	MODIS/Terra Coarse Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 5km ISIN Grid	MOD43B4C	MOD_PR43B	MODAPS
PGE30	MODIS/Terra Coarse Thermal Anomalies/Fire 5-Min L2 Swath 5km	MOD14CRS	MOD_PR14	MODAPS
PGE33	MODIS/Terra Leaf Area Index/FPAR Daily L4 Global 1km ISIN Grid	MOD15A1	MOD_PR15A1	MODAPS
PGE33	MODIS/Terra Coarse Leaf Area Index/PFAR Daily L4 Global 5km ISIN Grid	MOD15A1C	MOD_PR15A1	MODAPS
PGE34	MODIS/Terra Coarse Leaf Area Index/FPAR 8-Day L4 Global 5km ISIN Grid	MOD15A2C	MOD_PR15A2	MODAPS
PGE36	MODIS/Terra Net Photosynthesis Daily L4 Global 1km ISIN Grid	MOD17A1	MOD_PR17A1	MODAPS
PGE36	MODIS/Terra Net Photosynthesis/Respiration Database Daily L4 Global 1km ISIN Grid	MOD17APS	MOD_PR17A1	MODAPS
PGE37	MODIS/Terra Coarse Net Photosynthesis 8-Day L4 Global 5km ISIN Grid	MOD17A2C	MOD_PR17A2	MODAPS
PGE38	MODIS/Terra Coarse Net Primary Production Yearly L4 Global 5km ISIN Grid	MOD17A3C	MOD_PR17A3	MODAPS

Table 7-6. MODIS Land Interim Products
(Continued)

PGE	Product Description	ESDT	Process ID	Production Center
PGE40	MODIS/Terra Land Cover Database 32-Day L3 Global 1km ISIN Grid	MOD12M	MOD_PR12M	MODAPS
PGE41	MODIS/Terra Coarse Land Cover Type 96-Day L3 Global 5km ISIN Grid	MOD12Q1C	MOD_PR12Q	MODAPS
PGE60	MODIS/Terra Geolocation Control Point Residuals 5-Min L2 50m	MOD03CP	MOD_PR03CP	MODAPS
PGE72	MODIS/Terra Vegetation Intermediate Composite 16-Day L4 Global 250m ISIN Grid	MOD44CQ	MOD_PR44C	MODAPS
PGE72	MODIS/Terra Vegetation Intermediate Composite 16-Day L4 Global 500m ISIN Grid	MOD44CH	MOD_PR44C	MODAPS
PGE72	MODIS/Terra Vegetation Intermediate Composite Metadata 16-Day L4 Global	MOD44CT	MOD_PR44C	MODAPS
All Land	MODIS/Terra Land Quality Assurance	MODLM_QA	MOD_PRLQA	MODAPS
Several Land	MODIS/Terra Land Subsetting QA Files	MOD_SS	MOD_PRSS	MODAPS

Table 7-7. MODIS Atmosphere Interim Products

PGE	Product Description	ESDT	Process ID	Production Center
PGE04	MODIS/Terra MOD_PR04 Diagnostic File for Uncorrected Water Vapor 5-Min L2	MOD04_QC	MOD_PR04_05	MODAPS
PGE04	MODIS/Terra MOD_PR05 Diagnostic File for Uncorrected Water Vapor 5-Min L2	MOD05_QC	MOD_PR04_05	MODAPS
PGE04	MODIS/Terra MOD_PR05 Final Diagnostic File for Corrected Water Vapor 5-Min L2	MOD5C_QC	MOD_PR04_05	MODAPS
PGE05	MODIS/Terra Orbital Aerosol Product 1-Orbit L3 Swath 18km ISIN Grid	MOD04L_O	MOD_PR04LO	MODAPS
PGE06	MODIS/Terra MOD_PRO6CT QC File for Cloud Top Algorithm 5-Min L2	MOD6CTQC	MOD_PR06CT	MODAPS
PGE06	MODIS/TerraMOD_PR06CD QC File for Cirrus Detection Algorithm 5-Min L2	MOD6CDQC	MOD_PR06CD	MODAPS
PGE06	MODIS/Terra MOD_PR06OD QC File for Cloud Optical Depth Algorithm 5-Min L2	MOD6ODQC	MOD_PR06OD	MODAPS
PGE06	MODIS/Terra Cloud Product Temporary File in HDF Format 5-Min L2	MOD6ANCT	MOD_PR06OD	MODAPS

Table 7-7. MODIS Atmosphere Interim Products
(Continued)

PGE	Product Description	ESDT	Process ID	Production Center
PGE56	MODISTerra Aerosol/Water Vapor/Cloud Daily L3 Global 0.1Deg CMG	MOD08D3H	MODPR08	MODAPS
PGE69	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone 1Deg CMG	MOD08_TL	MOD_PR08T	MODAPS
PGE69	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone 0.1Deg CMG	MOD08TLH	MODPR_08TL	MODAPS

Table 7-8. MODIS Oceans Interim Products

PGE	Product Description	ESDT	Process ID	Production Center
PGE09	MODIS/Terra Ocean Color Space-Binned Composite QC Products 5-Min L3 Global 1km ISEAG	MODOQBqq (where qq = 51...61, 63...66)	MOD_PRmsbin	MODAPS
PGE09	MODIS/Terra Ocean Color Space-Binned Composite Params 1-26 5-Min L3 Global 1km ISEAG	MODOCBnn (where nn = 1 ... 36)	MOD_PRmsbin	MODAPS
PGE10	MODIS/Terra Sea Surface Temperature Space-Binned Composite Params 1-4 5-Min L3 Global 1km ISEAG	MOD28Bmm (where mm = D1, D2, N1, or N2)	MOD_PRmsbin	MODAPS
PGE10	MODIS/Terra Sea Surface Temperature Space-Binned Composite QC Products 5-Min L3 Global 1km ISEAG	MODSQBrr (where rr=D1...D9, DA, N1...N9, NA)	MOD_Prmfill	MODAPS
PGE20	MODIS/Terra Ocean Color Time-Binned Interim Params 1-36 Daily L3 Global 1km ISEAG	MODOCAnn (where nn = 1 ... 36)	MOD_PRmtbin	MODAPS
PGE20	MODIS/Terra Sea Surface Temperature Time-Binned Interim Params 1-4 Daily L3 Global 4km ISEAG	MOD28Amm (where mm = D1, D2, N1, or N2)	MOD_PRmtbin	MODAPS

Table 7-8. MODIS Oceans Interim Products
(Continued)

PGE	Product Description	ESDT	Process ID	Production Center
PGE20	MODIS/Terra Interim Ocean Color and SST QC {Mean}Maps Daily L3 Global {1km} CylEqDis {Std. Dev.} {36km} {Number} {Quality} {CommonFlags} {Flag Byte1} {Flag Byte2} {Flag Byte3}	MO{04,36}{M, S,N,Q,F,1,2, 3}A## (where ##=1...36, D1,D2, N1, N2, 51...61, 63...66, 69...78)	MOD_PRmmap	MODAPS
PGE49	MODIS/Terra Ocean Color Interim Composite Params 1-36 8-Day L3 Global 4km ISEAG	MODOCEnn (where nn = 1 ... 36)	MOD_PRmtbin	MODAPS
PGE49	MODIS/Terra Sea Surface Temperature Interim Composite Params 1-4 8-Day L3 Global 4km ISEAG	MOD28Emm (where mm = D1, D2, N1, or N2)	MOD_PRmtbin	MODAPS
PGE50	MODIS/Terra Ocean Color Interim Composite Params 1-36 24-Day L3 Global 4km ISEAG	MODOCRnn (where nn = 1 ... 36)	MOD_PRmfill	MODAPS
PGE50	MODIS/Terra Sea Surface Temperature Interim Composite Params 1-4 24-Day L3 Global 4km ISEAG	MOD28Rmm (where mm = D1, D2, N1, or N2)	MOD_Prmfill	MODAPS

APPENDIX A: ACRONYMS AND ABBREVIATIONS

ATBD	Algorithm Theoretical Basis Document
BRDF	Bi-directional Reflectance Distribution Function
CMG	Climate Modeling Grid
CPU	Central Processing Unit
DAAC	Distributed Active Archive Center
DAO	Data Assimilation Office
DPR	Data Processing Request
DPS	Data Production Software
EASE-Grid	Equal-Area Scalable Earth Grid
ECS	EOSDIS Core System
EDC	EROS Data Center
EGS	EOS Ground System
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
ESDIS	Earth Science Data and Information System
ESDT	Earth Science Data Type
FDD	Flight Dynamics Division
FOS	Flight Operations Segment
FPAR	Fraction Photosynthetically Active Radiation
GMT	Greenwich Mean Time
GSC	General Sciences Corporation
GSFC	Goddard Space Flight Center
HDF	Hierarchical Data Format
I/O	Input/Output
ICD	Interface Control Document
IDL	Interactive Data Language
IFOV	Instantaneous Field-Of-View
IMSL	Information Management System Library
IT	Instrument Team
JPL	Jet Propulsion Laboratory
L1	Level 1
L1A	Level 1A
L1B	Level 1B
L2	Level 2

APPENDIX A: ACRONYMS AND ABBREVIATIONS (Continued)

L2G	Level 2 Gridding
L3	Level 3
L4	Level 4
LAI	Leaf Area Indices
LST	Land Surface Temperature
LUT	Look-Up Table
MAPI	MODIS-Application Program Interface
MAST	MODIS Administrative Support Team
MCF	Metadata Configuration File
MCST	MODIS Characterization Support Team
MODAPS	MODIS Data Processing System
MODIS	Moderate Resolution Imaging Spectroradiometer
NCEP	National Center for Environmental Prediction
NCSA	National Center for Supercomputing Applications
NISE	Near Real-Time Ice and Snow Extent
NMC	National Meteorological Center
NPP	Net Primary Production
NSIDC	National Snow and Ice Data Center
PCF	Process Control File
PGE	Product Generation Executive
PSA	Product Specific Attribute
PSN	Net Photosynthesis
QA	Quality Assurance
SCF	Science Computing Facility
SDD	System Description Document
SDP	Science Data Processing
SDP S/W	Science Data Production Software
SDPS	Science Data Processing Segment
SDPTK	Science Data Production Toolkit
SDST	Science Data Support Team
SGI	Silicon Graphics Inc.
SMF	Status Message Facility
SPSO	Science Processing Support Office
SSI&T	Science Software Integration and Test
APPENDIX A: ACRONYMS AND ABBREVIATIONS (Continued)	
SST	Sea Surface Temperature

SSTG	Science Software Transfer Group
STM	Science Team Member
TBD	To Be Determined
TLCF	Team Leader Computing Facility
UMD	University of Maryland
URL	Universal Resource Locator
UTC	Universal Time Coordinated
V2.0	Version 2.0
V2.1	Version 2.1
V2.2	Version 2.2
V3.0	Version 3.0
V6	Version 6
WGS84	World Geodetic System 84
WWW	World Wide Web

APPENDIX B: REQUIREMENTS TRACEABILITY

Table B-1. Version 3.0 Requirements Traceability Matrix

MSDPS Reg. Spec*	Description	MSDPS V3.0 SDD
Software Process Requirements		
3.3	A software process is defined as any element of executable software listed in Table 3-1.	3.2.1
3.2-1	The software processes listed in Table 3-2 are the complete set of processes that shall be incorporated in the MODIS SDP S/W Release.	3.2.3
3.2-1	The output of the V2 software processes shall be consistent with the MODIS Data Product Catalog, which is available on-line at URL http://modarch.gsfc.nasa.gov/MODIS/DATAPROD/dataprodcatalog.html .	3.4
Science Data Processing Software Product Requirements		
4.1-1, 5.1	A MODIS product shall be defined as any data file identified with a Product ID in Table 3-3-1.	3.4
4.1-1	The definition of the level of a given product shall adhere to Table 3-1, MODIS Data Level Definitions.	3.1
Operations Requirements		
6.1	The V3.0 Release shall integrate all software processes available to the SDST software integration team into a SDP S/W system that executes all processes in the MODIS TLMCF, and executes the processes in the GSFC DAAC, EDC DAAC, and the National Snow and Ice Data Center (NSIDC) DAAC (if available in Release A) as specified in Table 3-1.	3.1, 3.2, 7
6.1	A PGE shall execute MODIS software processes within the ECS environment.	3.1, 3.2, 7

*MODIS Science Data Processing Software Requirements Specification Version 3 and Beyond, SDST-089, Change Notice 1; November 10, 1997.

APPENDIX C: ECS PRODUCTION RULES USED BY MODIS

C.1 Temporal

1. Basic Temporal - Activation based on start date/time and end date/time for output data.

Assumptions: Input data temporal range matches output data temporal range.

Requires: Specification of output data temporal range.

Specification of processing start date/time (i.e., start date/time of the period of processing based on the frequency of data availability).

2. Advanced Temporal - Activation based on start date/time and end date/time of output data with either start or end for input offset by deltas applied to the output data temporal range

Assumptions: The delta value may be positive or negative; a negative delta value applied to date/time would move the date/time back (earlier); a positive delta value applied to date/time would advance the date/time forward (later). Thus to extend both start and end boundaries, a negative delta would be applied to the start and a positive delta to the end. Granules in a delta range that is extended beyond the original Production Request specification have an associated availability time-out. Also, a delta value is specified at the granule-level.

Requires: Specification of data range.

Specification of start and stop temporal boundary deltas

3. Closest Granule – Request and staging of the nearest input granule of an ESDT from the Data Processing Request time. PDPS will search either forward or backward in time for a specified period of time until it finds a granule that matches the request.

Assumptions: Rule is implemented with a wait time for re-tries if no file is found.

Requires: Specification of length for time period of the search for the query.
Direction of search, forward in time or backward in time. (Future version may allow search in both directions for same DPR.)

APPENDIX C: ECS PRODUCTION RULES USED BY MODIS (Continued)

C.2 Orbit

Orbit-Based Activation is by orbit (PGE is scheduled per orbit). The orbit numbers and corresponding temporal ranges are maintained in an internal table and the temporal range of the input and output data is determined by LUT.

Assumptions: The PGE will not be activated without availability of all granules for an orbit. The internal orbit number table will be updated frequently (approximately every ten days).

Requires: Specification of orbit number range in the Production Request.

C.3 Periodic

1. Period (Calendar) Specification - Activation is for a specified calendar period (day, week, month, or year)

Assumptions: The PGE will not be activated without availability of all granules for the period to be run.

Requires: Specification of start and end for the production request.

2. Period Start_of_(N)_Days - Activation is for a selected period/cycle. The rule may be thought of as Start_of_Year for a period of N days rule.

Assumptions: Periods are calculated based on the beginning of the year by default. This may be overridden by user specification of different start for the selected period when the PGE is registered at SSI&T. The PGE may not be overridden for individual production requests. The PGE will not be activated without availability of all granules for the period to be run.

Requires: Specification of start and end for the production request.

Specification of the duration of the period when the PGE is registered. If period is not to be based on start-of-calendar year for begin calculation, a start date/time for the cycle must be specified when the PGE is requested at SSI&T.

3. Smart Start of Year - Activation at the beginning of a new year resets the start of the selected period for production to the start of year as a default. Smart Start of Year

APPENDIX C: ECS PRODUCTION RULES USED BY MODIS (Continued)

has a default of inclusion of data from the next year at the last period of the year. The default may be overridden.

Assumptions: An end-of-year processing period which spanned the beginning of the new year will complete including data processed for the new year up to the end of the period. The effective reset to start of year for the cycle results in redundant inclusion of these data. If the default is overridden, the data from the new year will not be included during the last period of the old year.

C.4 Tiling

1. Latitude/Longitude Tiling - Activation is based on a tile specified in the Tile Definition File (contains the Tile ID and Latitude/Longitude of the Tile Corners). The Tile ID is passed back to the PGE as a runtime parameter in the PCF.

Assumptions: The PGE will be activated after a specified query delay time for the specified tile if there are any input granules available or if a minimum number is specified during registration of the PGE at SSI&T (use of Minimum Number of Granules Production Rule).

Requires: Specification by PDPS of the Tile ID for the tile to be processed or specification of the Latitude/Longitude for which the Tile ID may be determined.

2. Zonal Tiling - Activation is based on a Zone Definition File which contains the Latitude coordinates which bound the Zonal tile. The Latitude coordinates designate a zone extending around the Earth.

Assumptions: The PGE will not be activated without availability of all granules for the specified tile or a minimum number as specified during registration of the PGE at SSI&T (use of Minimum Number of Granules rule).

Requires: Specification of the Zonal Definition File for the zone to be processed or specification of the Latitudes from which the zone can be determined.

APPENDIX C: ECS PRODUCTION RULES USED BY MODIS (Continued)

C.5 Additional Inputs

1. Alternate Inputs - Activation is based on a hierarchy of choices of input files of a specified ESDT (first choice, second choice, etc.).

Assumptions: The PGE will not be activated unless one of several alternate inputs is available. One input is considered to be “primary” input. Each input has an associated time-out such that if the input is not available within the time-out, processing will wait for the next alternate through its time-out period, and so on. If the primary input or a higher priority alternate becomes available during the wait period for a lower priority alternate, the PGE will be activated with the available primary input or higher priority alternate if that is the one that becomes available first.

Requires: Specification of each alternate, the preference order, and a time-out for each input.

Specification of the first alternate as the primary.

Specification of the category which groups the alternates and the runtime parameter which identifies which input is available.

2. Optional Inputs - Activation is based on availability of one or more specified Optional Inputs of a specified ESDT within a time-out period, after which the PGE is activated without the Optional Inputs.

Assumptions: The PGE will not be activated until the time-outs have expired for the Optional Inputs. The PGE will be activated at that time without any of the Optional Inputs. The time-out for the Optional Inputs begins only after the required inputs are known to be available. The time-outs for multiple Optional Inputs are concurrently “counted down.”

Requires: Specification of each optional input, a time-out for each input (optional), and a runtime parameter for each input to identify which input is available .

APPENDIX C: ECS PRODUCTION RULES USED BY MODIS (Continued)

C.6 Conditional Activation and Query-Based Activation

1. a. Metadata Based Query to determine input granules - Activation is based on results of a query of metadata attributes of a specified ESDT for available granules which meet the query criteria.
b. Metadata Based Activation - Activation is conditional based on a metadata values of input data.
2. Minimum Number of Granules - Activation is conditionally based on availability of a minimum number of data granules of a specified ESDT.

C.7 Data Base Query (Override of Run-Time Parameters)

Runtime Parameters - Runtime parameters from the PDPS database may override defaults set during SSI&T in the instantiated PCF. Overrides occur when a Production Request is entered. Examples of this include Data Day (for MODIS), Orbit Path Number (for MISR). This feature is not limited to these examples. The MODIS example is presented below in detail:

Data Day Example

The PGE is scheduled per MODIS Data Day. The MODIS "Data Day" is internally tracked within ECS. The current "start dataday" and "end dataday" are passed to the PGE as run-time parameters, which are then used in a Metadata Based query to determine granules which meet the search criteria (data day). However, activation is based on availability of all granules for the data day or may be based on a minimum number of granules available as established when the PGE is registered at SSI&T. The timing of the query would be pre-determined such that the execution would proceed if the number of granules condition is met.